JUNE, 1955

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

IN THIS ISSUE

Editorial:
e country's prospects for
re good — how about yours?"

•

Talk of the Month:
. Hollengreen's "guaranteed
annual increase
n rate of productivity"

•

CYPAK SYSTEMS
ew concept in the electrical
l of machines and processes

•

"THROW AWAY"
ew trend in carbide tooling

•

room MODERNIZATION
with dieing machines

•

gh production RIVETING
by TAPE CONTROL

•

tro-mechanical CONTROL
SYSTEMS
l components for diversity
of PRODUCTION

•

specting for business: "The
hnical Side of Estimating"

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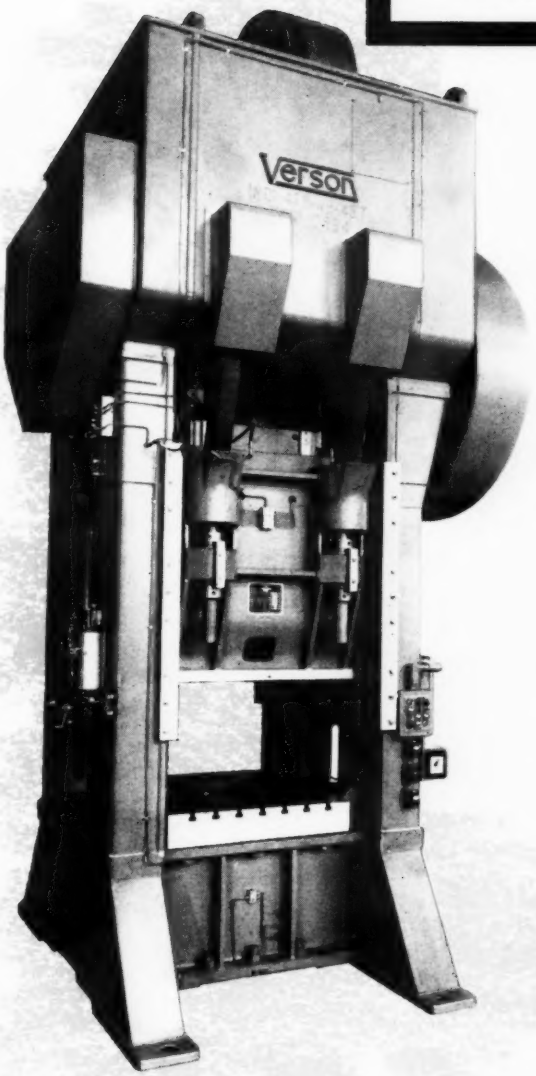
BPA

for fast, accurate deep drawing...



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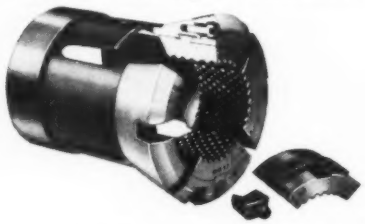
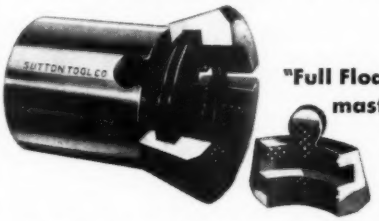


Patented

Change pads without removing collets from machine. Holding screws inserted into collet to prevent loosening of pads. Clamp has compensating spring effect to absorb shock in restocking operation. Reduces collet inventory.

FULL BEARING ON HOT ROLLED STOCK

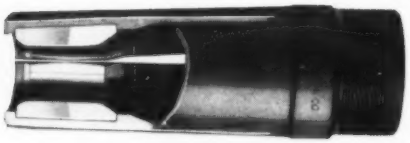


"Full Floating" Style "F" master collets

Patented

Handles hot rolled stock varying from .010" to .040", and still provides accurate gripping. Easily changeable jaws float independently and come to a full bearing on the stock. Prevents slippage. Lowers power demand.

Popular Sizes of Standard Type Collets and Feeders Carried in Stock for Immediate Delivery!



Style "L" Master Feeders

Interchangeable and replaceable pads seated in recess, with lug engaging a slot in the master to keep pads from rotating. No pins or screws. Style "L"s handle stock practically up to machine capacity, and full range of machine.

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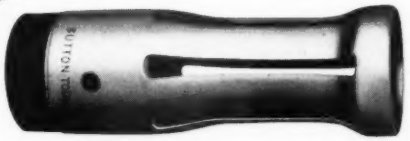

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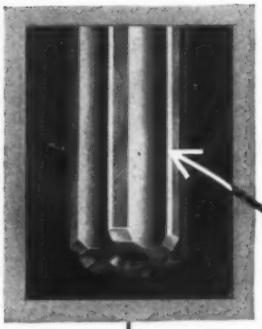

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formerly Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-1951

George J. Huebner, Founder

VOL. XXI—No. 3 JUNE, 1955

CONTENTS

Editorial Index 66
Editorial 69
Shop Aids 115
Publication Previews 134
Progress on Parade 152

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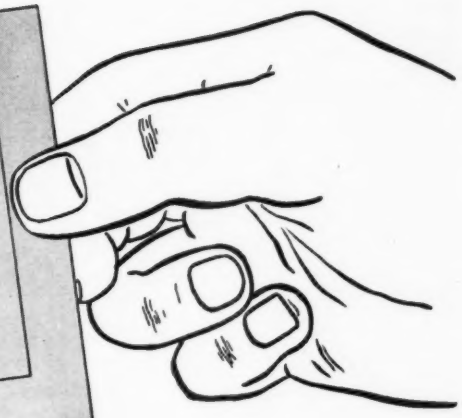

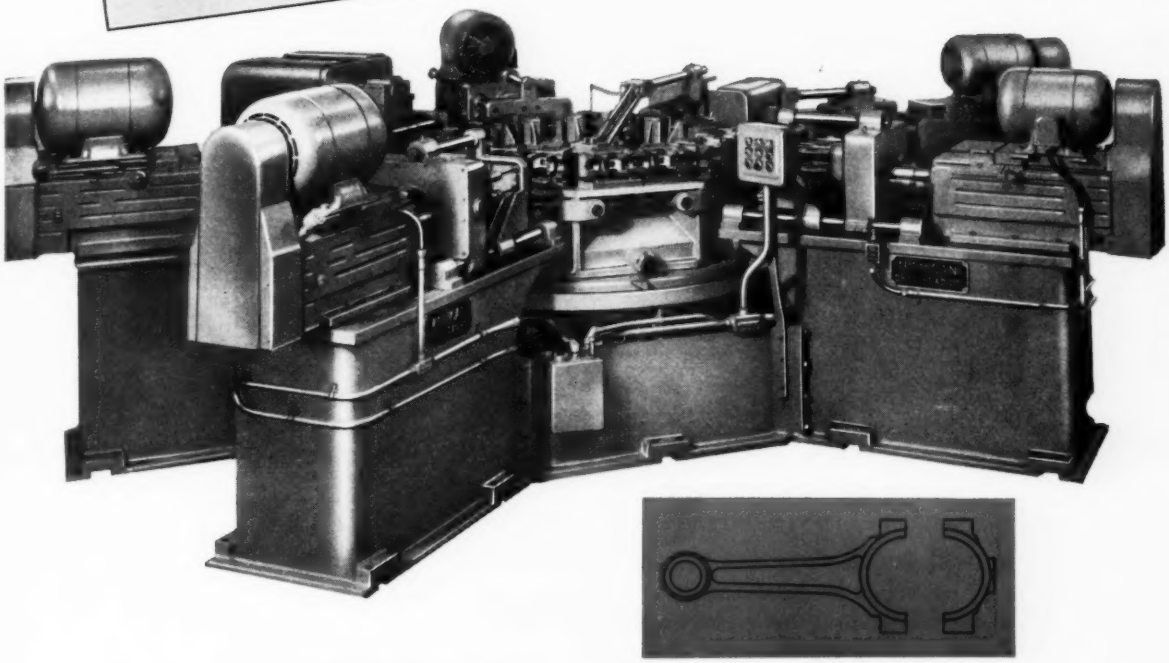

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★ ★ ★ ★ ★ ★ ★ ★

Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★

THE OUTLOOK FOR THE MACHINE TOOL INDUSTRY*

by M. A. Hollengreen

President, National Machine Tool Builders' Association

and

PRESIDENT, LANDIS TOOL COMPANY

Waynesboro, Pennsylvania

The world today is so full of new slogans that I might just as well put another one on the market.

I think it is time the nation's machine tool industry put out a slogan of its own; and I think that slogan ought to be, "a guaranteed annual increase in rate of productivity."

A certain gentleman in Detroit, whom you all know, is campaigning on behalf of a guaranteed annual wage; so I think it is only fair that the machine tool industry promote a guaranteed annual increase in rate of productivity.

But I doubt whether the gentleman in Detroit has the slightest concept of the relationship between his objective and ours.

The machine tool industry stays alive because year after year it actually **can** guarantee, to the people who buy its products, an increase in productivity.

But the gentleman in Detroit, who is talking about an annual guaranteed wage, speaks in the same breath about automation, which he says will throw hundreds of thousands of men out of work. His idea seems to be

. . . Continued on page 10

*Mr. Hollengreen's talk was a highlight of the 19th Annual Machine Tool Electrification Forum, held in Buffalo, N. Y., April 19 and 20, 1955, sponsored by the Westinghouse Electric Corporation.

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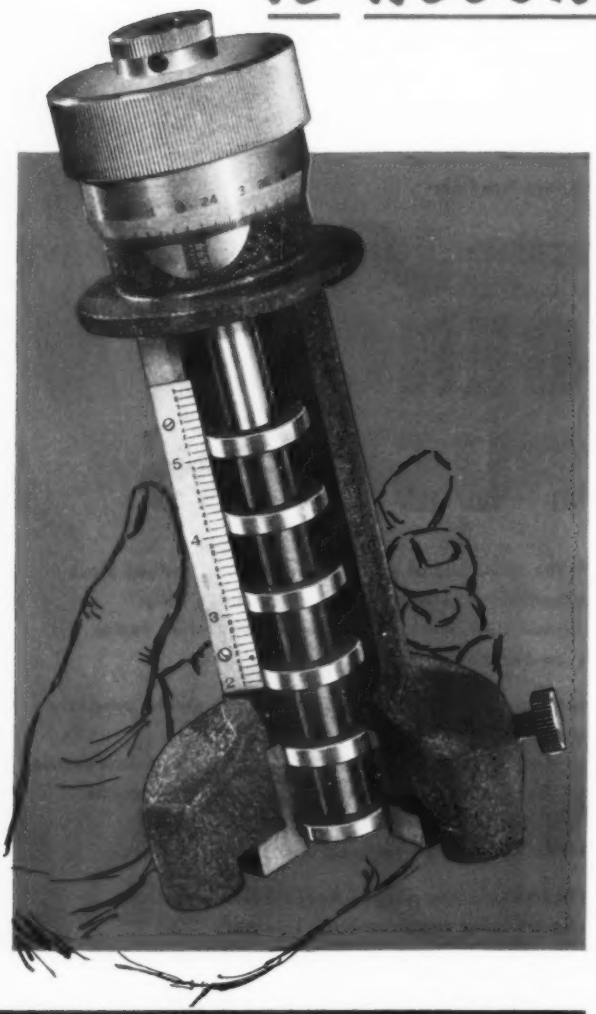

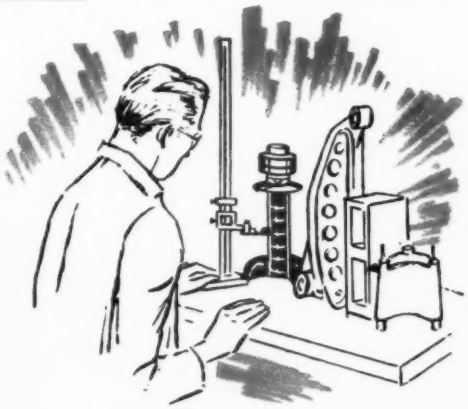

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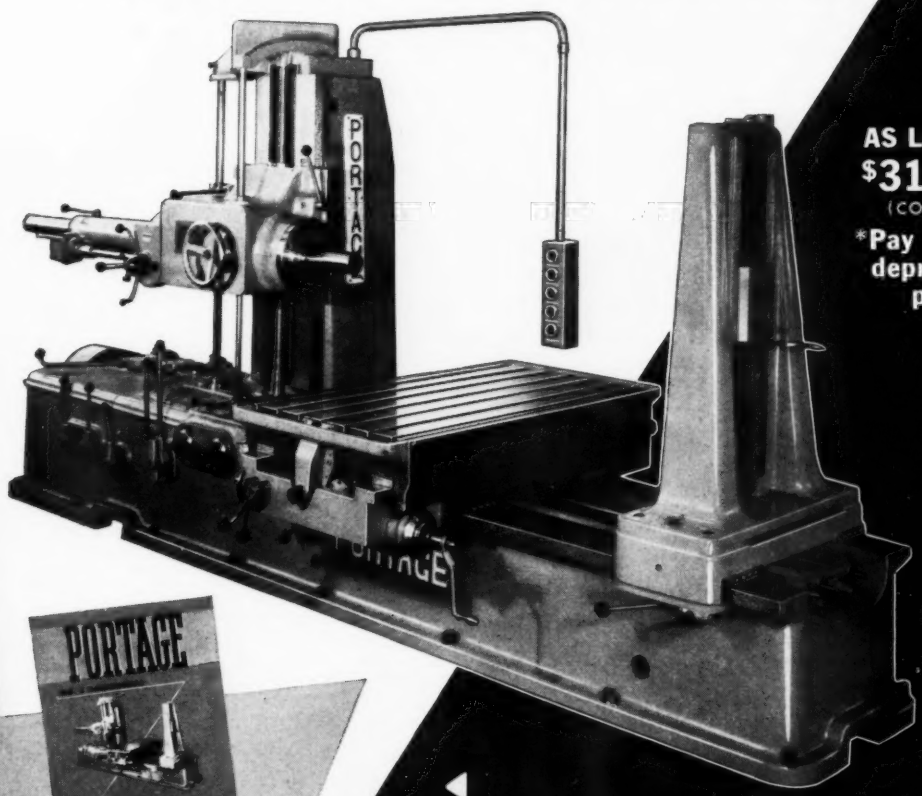

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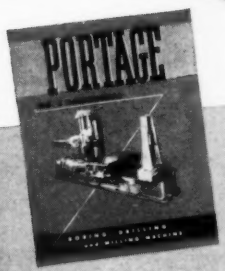

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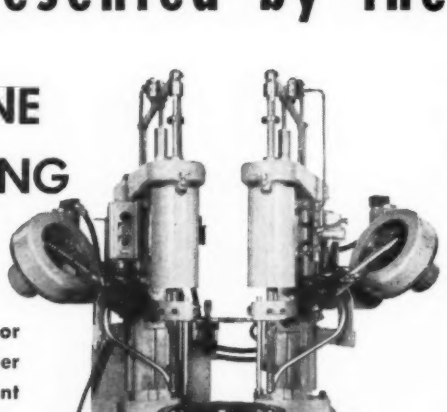

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CIRCLE INFORM-A-GRAM KEY NO. 10

. . . Month's Talk, from page 6

that the only way to keep people employed is to **decrease**, rather than increase, their rate of productivity.

So, right there the union comes smack up against the basic philosophy of the machine tool industry. I want to challenge them on that ground.

In the first place, the word "automation" is nothing but a semantic invention; there is nothing new about it. What the union is talking about is simply "mechanization." It is still the same thing, even though it has been given a new name, just as morticians are still undertakers.

Secondly, the union apparently assumes that inefficient production represents continuing assurance of employment, and that production efficiency is allowable only if accompanied by an employment guarantee.

The fallacies of this position are almost too obvious to recite.

In the United States, under our competitive system, companies constantly strive to give the customer better values for his money.

In order to give the customer better values, the arithmetic of volume always enters into the picture.

If we can get volume up high enough, then we can get costs down to where a lot of people can buy our products; or conversely, if we can get the price down to where a lot of people can buy our products, then we can use volume methods of production.

This whole system is founded on the principle of interchangeability of parts, made possible by the accurate functioning of machine tools.

The larger the potential volume, the more we can utilize the principle of automatic operations, because the more the operations are repetitive, the greater is the extent to which the work can be done by the machine and the function of the operator raised to that of, you might say, an engineer on the job, watching the controls.

Under the stress of competition, every successful company makes a concerted drive to offer more people better things at lower costs. This can be done as the productivity of the individual workman is multiplied by

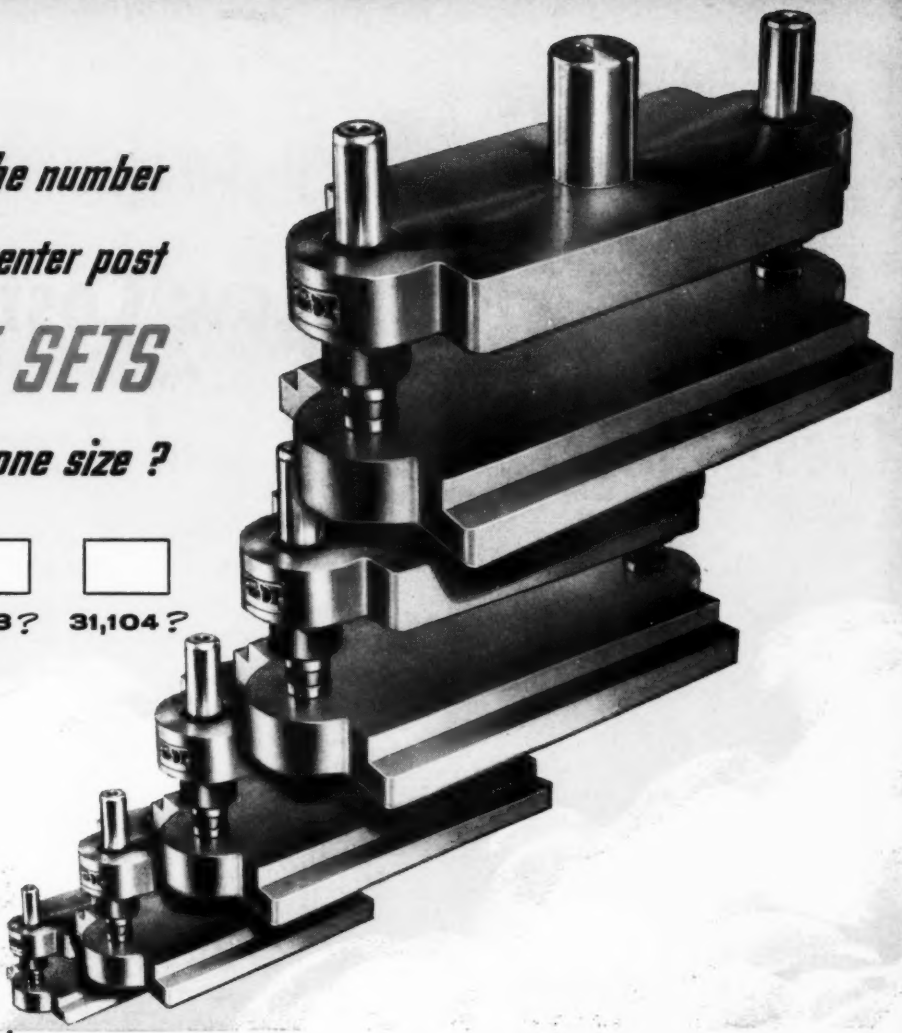
. . . *Continued on page 14*

can you guess the number of different center post

DANLY DIE SETS

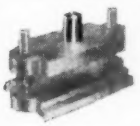
in stock–in just one size ?

67 ? 575 ? 1433 ? 31,104 ?



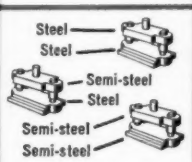
3 different punch holder thicknesses

3 different die shoe thicknesses



6 shank size variations

4 bushing type variations



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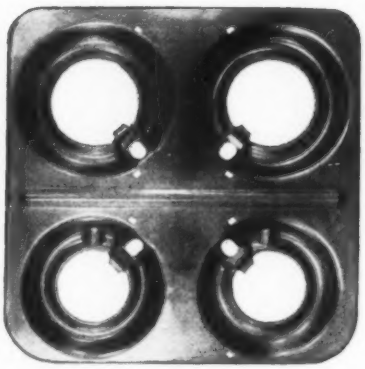

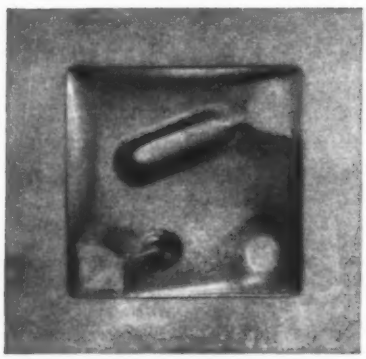

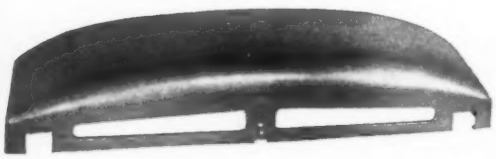

Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

Major Vulcan Services . . . Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

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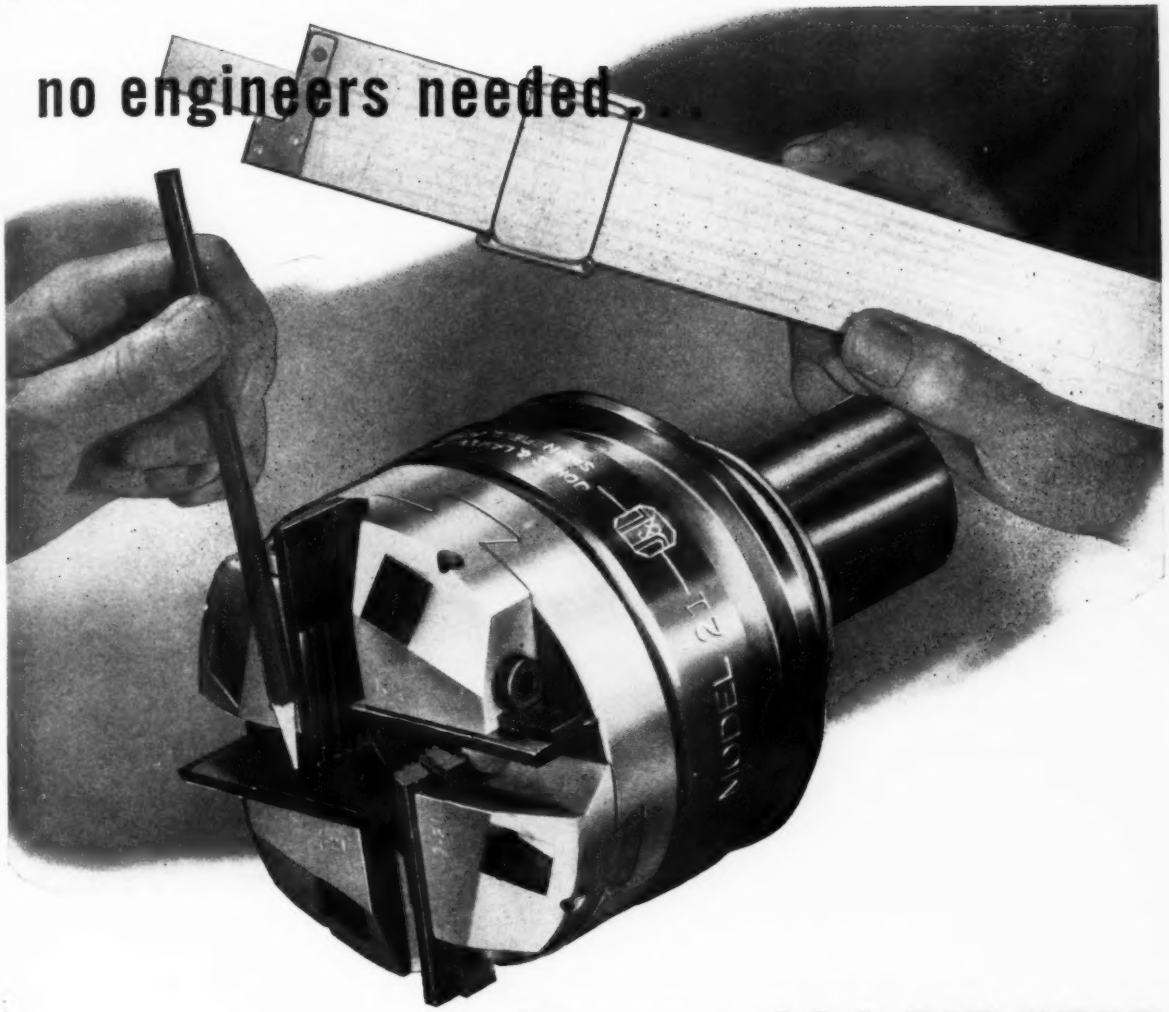
CIRCLE INFORM-A-GRAM KEY NO. 12

no engineers needed...



...to use a J & L DIE HEAD

Here's why...

Chasers are changed and set in a matter of seconds without disturbing the holders or die head...

Only one set of holders is required to handle coarse, fine, or multiple threads over a wide range of sizes...

Controlled ratchet teeth provide definite points for location, locking and thrust support—making it easy to locate all four chasers in the same relative cutting position.

Best of all—the RESULTS ARE GUARANTEED... not sometimes, but *every* time. (And you get that in *writing*... Class III or better).

Disregard Class III if you like, but remember... J&L's system of *"no approximations"* adds up to even *more* savings for Class I and II.

You're paying for results... be sure you get them!

P.S.

Why pay for 20 sets of ordinary chasers when you can get 20 controlled resharpenings with one set of J&L Chasers—PLUS—Guaranteed performance.

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Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 519 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L THREAD TOOL DIV.

CIRCLE INFORM-A-GRAM KEY NO. 13

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Illustrated is a rugged drilling operation that uses the durability and cutting speed of standard Whitman & Barnes High Speed Drills. This 446 stainless steel tube sheet for a special heat exchanger in a chemical plant requires 602 holes 2 11/16" in diameter be drilled through the 2½" depth of the sheet. W & B drills are operated without regrinding for approximately four hours at 69 R.P.M. and with .012" feed. For the best in drilling performance on your every operation—specify W & B.

Call your W&B distributor for best service and highest quality

He can save you money by supplying from his stock . . . what you need when you need it!

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CIRCLE INFORM-A-GRAM KEY NO. 14

. . . Month's Talk, from page 10

the more intelligent use of machines.

We in the United States have an understanding of mass markets such as they apparently do not have anywhere else in the world. We have a feeling in this country that progress is inherent in the very nature of things.

We believe that as research and technology advance, a man should always be able to get more and better things, in return for his day's work, this year, than he got last year.

Unlike the business men of other countries, the industrialists of our country understand that the safe road to profits is a small profit margin on a large volume of sales, instead of a high profit margin on a limited volume of sales.

In America, we don't think that only a few privileged people are entitled to modern comforts and conveniences. We believe that practically everyone should have an automobile, and a washing machine, and a refrigerator, and a radio. We understand that there is no limit to human desires—and if we can get the cost of production down low enough, we can get mass markets that will build up great industries, because people **want** the things that these industries can produce.

Now — how do we get cost down?

We get costs down by automation; which as I said before, is simply a new word for mechanization.

Let's review the relationship between mechanization and employment. It's really very simple.

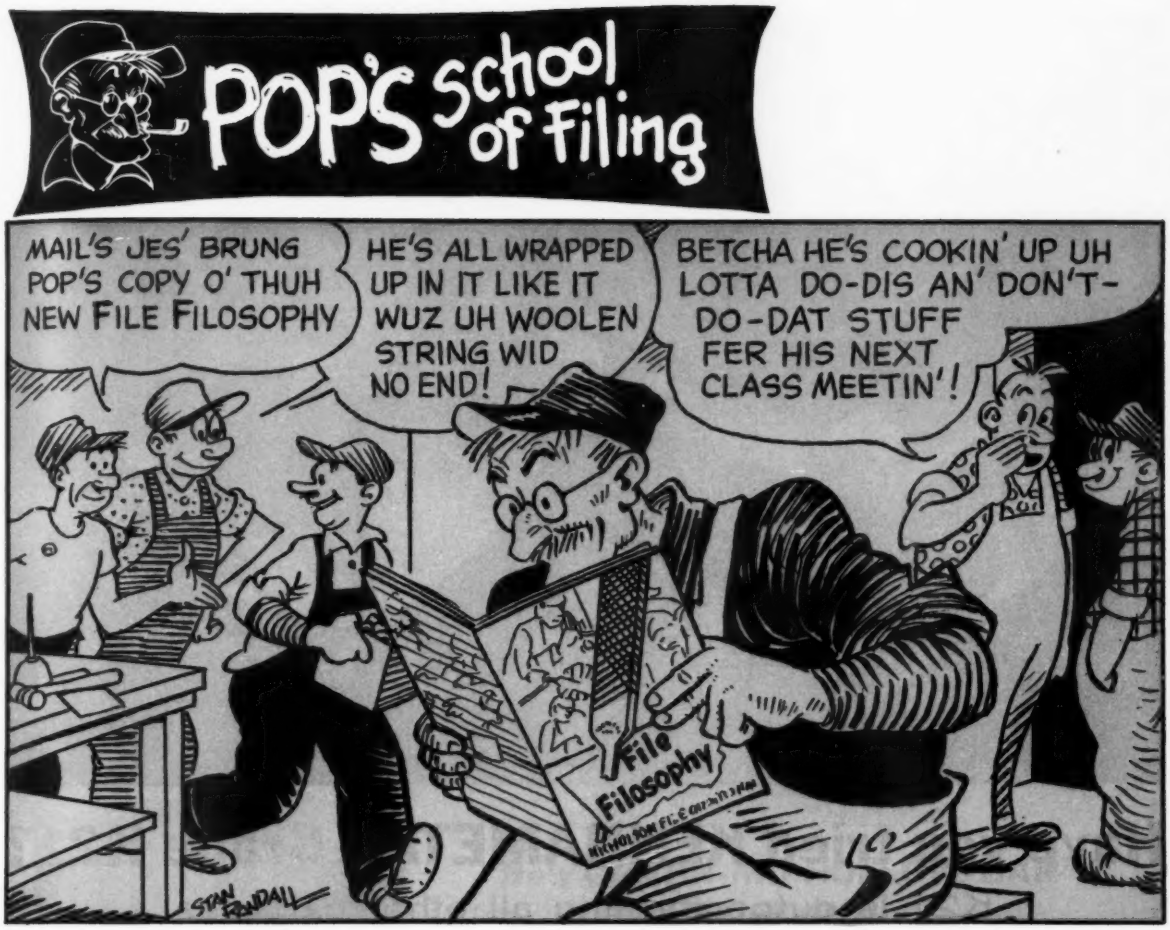
As manufacturing costs go down, more people can buy a product.

As production goes up, the manufacturer can employ more people.

As more people are employed, more people can buy the products of American industry.

As more people get into the market, this in turn increases potential volume and makes possible additional mechanization, which will cut production costs still further and open up the market for hundreds of thousands of other people. And when this happens, increased volume will again result in the employment of more men.

. . . *Continued on page 18*


POP'S school of Filing
MAIL'S JES' BRUNG POP'S COPY O' THUH NEW FILE FILOSOPHY
HE'S ALL WRAPPED UP IN IT LIKE IT WUZ UH WOOLEN STRING WID NO END!
BETCHA HE'S COOKIN' UP UH LOTTA DO-DIS AN' DON'T-DO-DAT STUFF FER HIS NEXT CLASS MEETIN'!
File Filosophy
STAN FRANDALL

For many years Nicholson File Company's "File Filosophy" has been a master key to *lower filing costs, higher working efficiencies* and *increased mechanical efficiency*.

Now this most widely used manual on files and filing has been revised-and-polished with up-to-date changes and more pages—including an added chapter on selection and use of Rotary Files and Burs, of special interest to Industry.

With today's multiplicity of metals and alloys, accuracy and speed in production and assembly-line operations make the use of *The right file for the job* increasingly important.

Nicholson's wide range of job-tested Special Purpose files makes this book especially useful to production engineers and shop foremen, as well as to management and purchasing heads.

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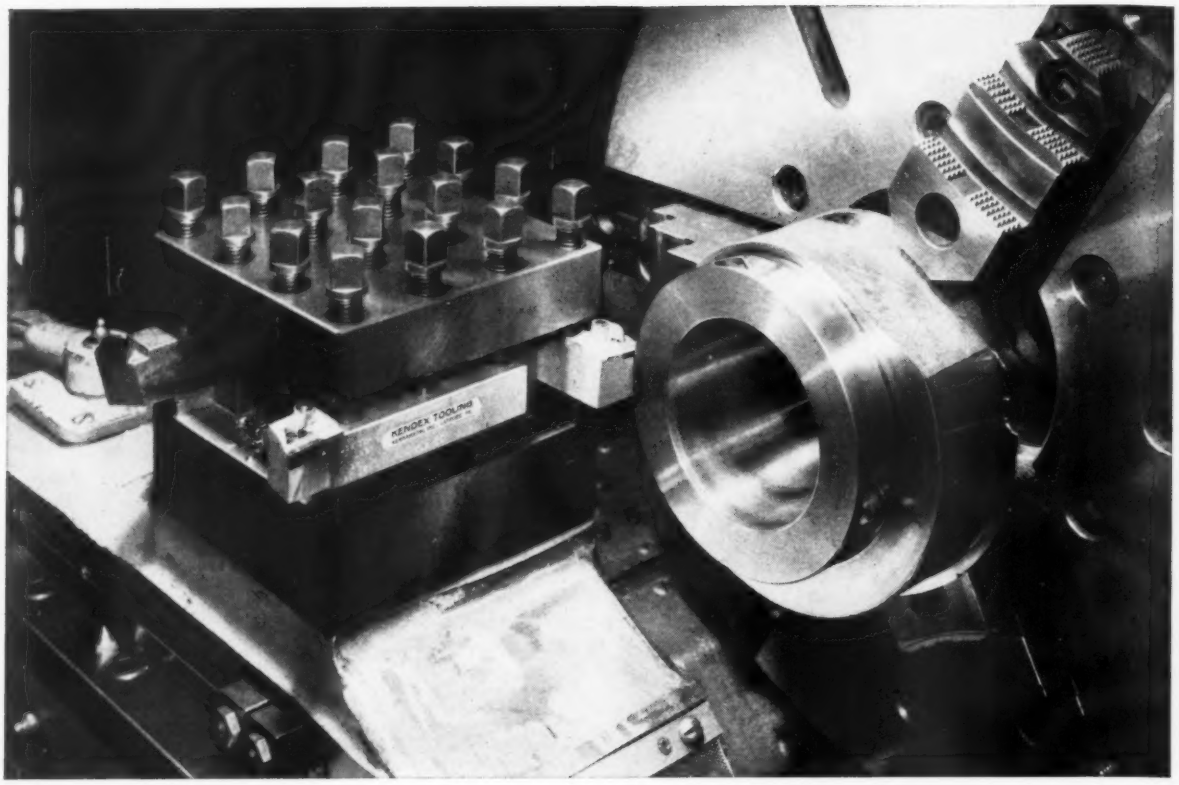
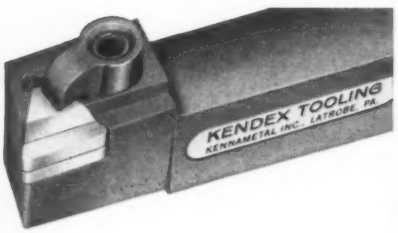
CIRCLE INFORM-A-GRAM KEY NO. 15



Have you tried KENNAMETAL* Grade K21?

K21 is outperforming all other carbides in the General Purpose steel-cutting group



K21 is rapidly becoming recognized as the leader of all General Purpose steel-cutting grades in the carbide industry. Its superior performance is due to exceptionally high edge strength combined with superior wear qualities and resistance to cratering. K21 is ideal for machining the newer high tensile strength steels on modern high-speed machines, and, due to its range, it does an excellent job on older slower-speed machines as well.

K21 solves problem of troublesome operation

The photograph above shows an operation which involved turning two finished diameters on SAE 1080 steel casting with a BT16G insert in a Kendex* KTAR16 holder, using a new 40 HP Warner & Swasey turret lathe. Both cuts were made with the same tool. The 8″ diameter was rough turned at 236 SFM, 5/16″ depth, and finished at 324 SFM, 1/16″ depth, length of cut 2″, feed 0.0167″. The second diameter was finished at 6″, 2″ wide cut, interrupted by 3 diagonal 5/8″ holes. One cutting edge turned 6 pieces before indexing, while the best competitive carbide *was unable to turn even one piece* successfully because it chipped. K21 has been standardized for this troublesome operation.

Another test showed K21 increased production 33% per index over nearest comparable, competitive grade on a finish turn at 705 SFM, 0.010″ feed, and 0.005″ depth, machining laminated stator cores.

On another job K21 eliminated breakage and lowered tool cost per piece from $0.20 for other carbides to $0.004 for K21.

Let us demonstrate K21 and the new Kendex Tooling—a perfect team for the majority of your steel-cutting operations. Call your Kennametal representative today, or write to KENNAMETAL INC., Latrobe, Pa.

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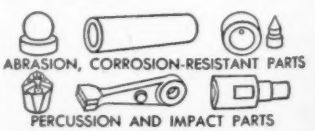
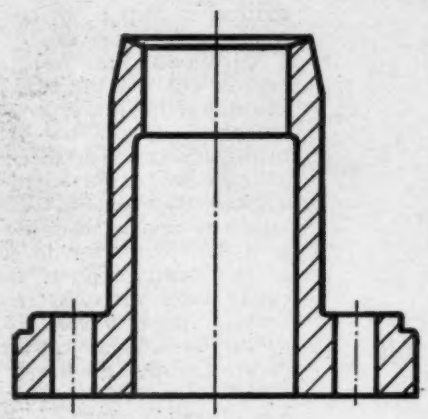
INDUSTRY AND KENNAMETAL ...Partners in Progress



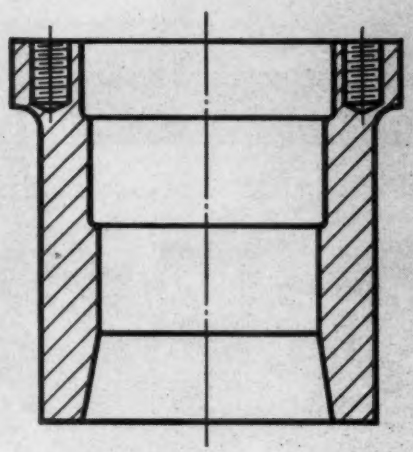
CIRCLE INFORM-A-GRAM KEY NO. 16

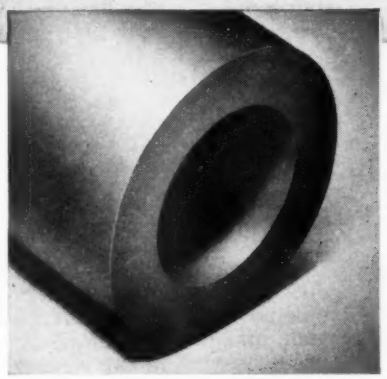
HOW TO MAKE RING-SHAPED TOOL STEEL PARTS FASTER AND EASIER

FORMING AND PIERCING DIE



BLANKING AND FORMING DIE





Graph-Mo Hollow-Bar comes in sizes from 4 to 16 inches O. D. with various wall thicknesses. Immediate delivery on many sizes from warehouses of the distributors, A. Milne Co. and Peninsular Steel Company.

New GRAPH-MO HOLLOW-BAR® eliminates drilling— and machines 30% faster

YOU can eliminate the time-consuming drilling operation when you make ring-shaped tool steel parts from Graph-Mo Hollow-Bar®. The hole comes ready-made. First step is finish boring. There's less scrap, and you use less steel.

On top of that, the rest of the machining's faster—30% faster, compared to other tool steels. That's because Graph-Mo has free graphite in its structure. It means less tendency to pick up, scuff and gall, too.

That same graphite plus diamond-hard carbides give Graph-Mo amazing wear resistance. Users have written us that Graph-Mo outwears other tool steels, on the average, three to one!

Graph-Mo responds uniformly to heat treatment. And no other tool steel is as stable. Proof: after 12 years, a typical Graph-Mo steel master plug gage changed less than 10 millionths of an inch in dimension!

More facts about Graph-Mo Hollow-Bar? Write The Timken Roller Bearing Company. Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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CIRCLE INFORM-A-GRAM KEY NO. 17

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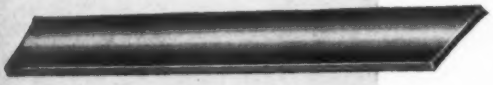
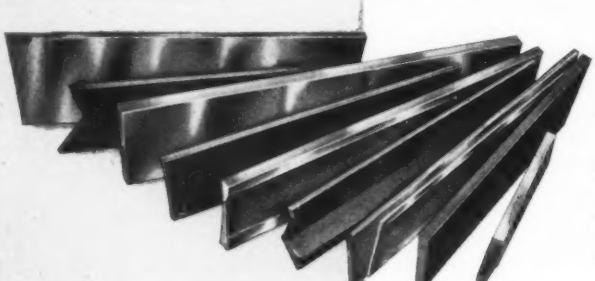


JCO BLADES

T-CUT BLADES



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When it comes to that toughest of all metal cutting jobs . . . the parting-off of work . . . you can't do better than choose from the complete line of Pratt & Whitney Cut-Off Blades.

Made from selected, specially purchased steels, they are carefully heat-treated. This provides maximum toughness and resistance to chip abrasion and wear. Also permits the use of minimum widths for stock conservation with ample rigidity and strength to resist flexing and breakage. Exceptionally fine grinding finish plus a distinctive surface hardening treatment means longer wear life.

Used singly or ganged together . . . Pratt & Whitney Cut-Off Blades are your best bet for improved performance and lower production costs. Be convinced; try them on your next job!

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MACHINE TOOLS • CUTTING TOOLS • GAGES

. . . Month's Talk, from page 14

This is the cycle that the United States of America has discovered. I don't think it is really understood as yet in any other part of the world.

It is a cycle that has given our United States the highest standard of living that the world has ever seen.

There are people who say that our living standards and our high employment level are due to our increase in population, to our natural resources, to our country's physical size, etc.

All these are contributing causes, but not the real reason. China has far more people than we have. Russia has vast natural resources. India occupies a comparable portion of the earth's surface. But none of these countries has developed living standards like ours; for in none of these countries have machines really been put to work, as we have put them to work, on behalf of the comforts and conveniences of the common man.

Our standard of living has been based primarily upon automation, if you want to use that new word — mechanization, as it has been called for the last century and a half. Call it what you will, it means simply increase in productivity due to supplying the workers more efficient means of production.

I can talk with some measure of authority on that subject, because that is the function of the machine tool industry.

In order to stay alive, our industry must, year after year, be able to show our customers ways and means of producing the products they make better and more cheaply than ever before.

In other words, we live by maintaining a factor of "guaranteed annual increase in rate of productivity."

And I would like to submit to the union that this factor is far more important to its members than any arguments on behalf of the so-called guaranteed annual wage, and contradicts completely its antiquated arguments on the subject of automation.

I say "antiquated" with good reason. I am amazed that at this late date the union has nothing more original to offer than to dig up the outmoded arguments against the machine that have been used by trade unionists off and on, for the last 150 years.

Over 150 years ago, when Dr. Cartwright invented the loom, the workers of the weaving industry in England attacked it because, they said, it would put them out of work. But employment in the textile industry multiplied in direct relationship to the progress of the loom.

In 1845, when Elias Howe, Jr., developed a sewing machine, the workers in clothing shops staged riots to prevent its introduction. But the sewing machine has since given employment to millions of people.

When Robert Fulton built the first steam boat, competitors paid men to try to wreck his machinery and drive him out of business, but the invention of the steam boat created vast employment opportunities.

In England, in 1821, when George Davidson, the inventor of the locomotive, made his first successful trip by rail, many people said that the railroad would throw so many men out of work that there would be a revolution. They were right about the revolution. The railroads created vast new avenues for employment.

When Christopher Sholes invented the typewriter, people working in offices were worried about their jobs. After the typewriter was perfected, office jobs multiplied by the thousands.

When Mergenthaler invented the linotype, the type setters were sure they would be put out of jobs. But the linotype opened up thousands of new jobs.

In the steel industry, when the continuous rolling mill was invented, there was a burst of propaganda to the effect that it would put the people out of work. But what happened was that the continuous rolling proess produced a better product at a lower cost, and made sheet steel available to a host of new markets. This increased the demand, and as demand increased, employment increased. History shows that employment in the steel industry accelerated with the adoption of the continuous rolling process, which theoretically was supposed to put men out of work.

History in practically every industry shows that increase in employment has been directly parallel to increase in mechanization.

. . . *Continued on page 26*

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BLUE HELIX or STRAIGHT FLUTE

AVAILABLE IN STANDARD NUMBER, LETTER AND FRACTIONAL SIZES

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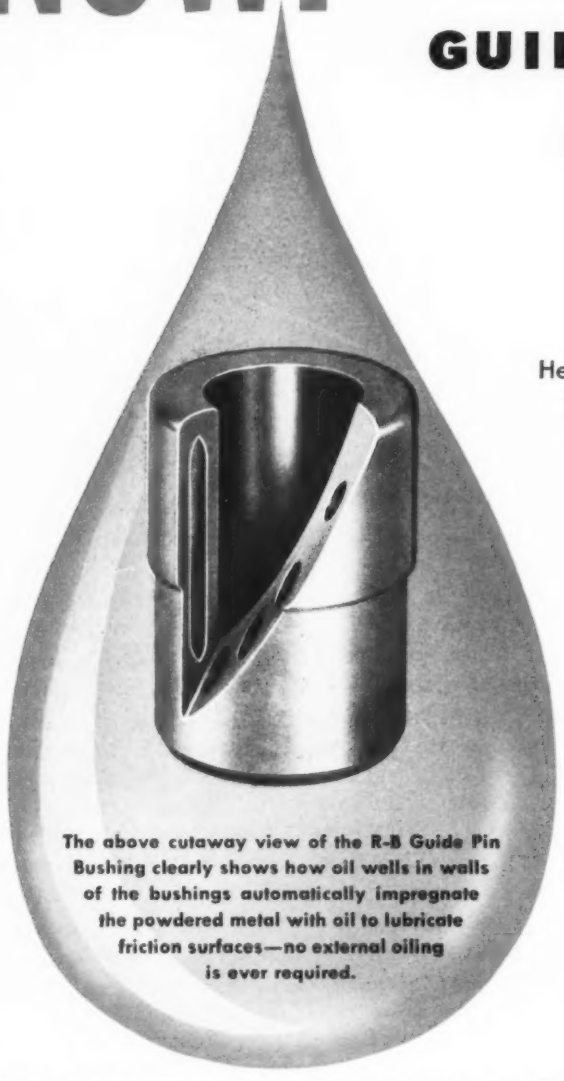

The above cutaway view of the R-B Guide Pin Bushing clearly shows how oil wells in walls of the bushings automatically impregnate the powdered metal with oil to lubricate friction surfaces—no external oiling is ever required.

Here's an entirely new concept in guide pin bushings—made of heat treated powdered alloy steel, each bushing has filled internal oil wells. Lubrication to friction surfaces is automatic and no external oiling is required throughout the long life of the bushings.

Wear characteristics of these bushings are comparable to that obtained with finest bronze bushings. In addition, this new R-B design greatly reduces guide pin wear and the possibility of seizing or galling. Self-oiling, less guide pin wear and longer life add up to minimum maintenance, reduced costs and maximum usage of press time.

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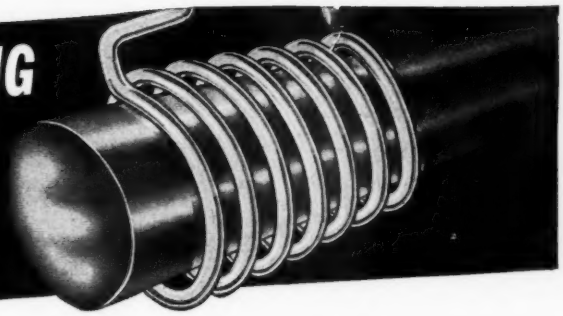

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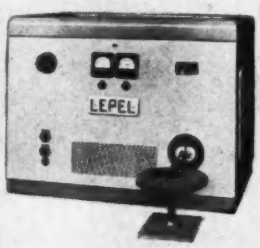
If you are interested in the application of induction heating you are invited to send samples of the work with specifications of the operations to be performed. Our engineers will process these samples and return the completed job with full data and recommendations without any cost or obligation.



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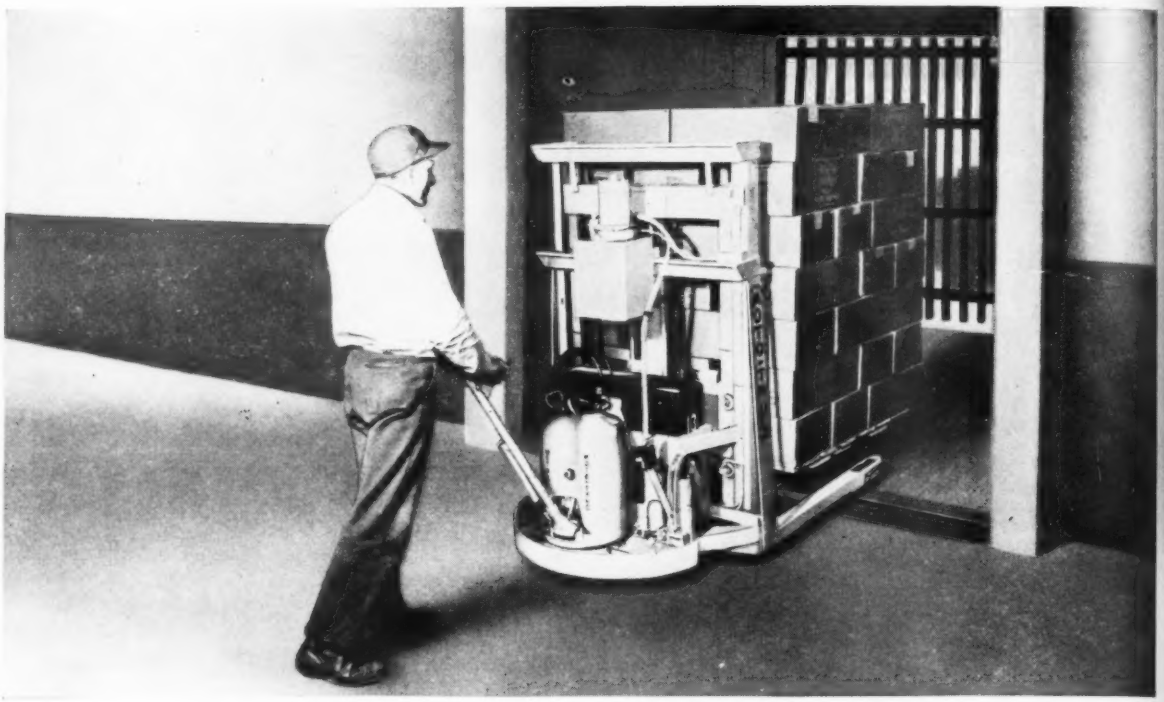
CIRCLE INFORM-A-GRAM KEY NO. 23



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Excessive re-handling of loads because of limited elevator capacities is often completely eliminated with Moto-Trucs. The light, yet powerful compactness of a Moto-Truc lets you move load *and truck* into an elevator with *weight capacity to spare.*

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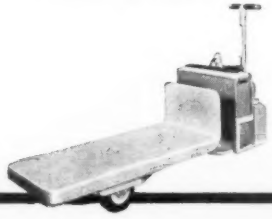
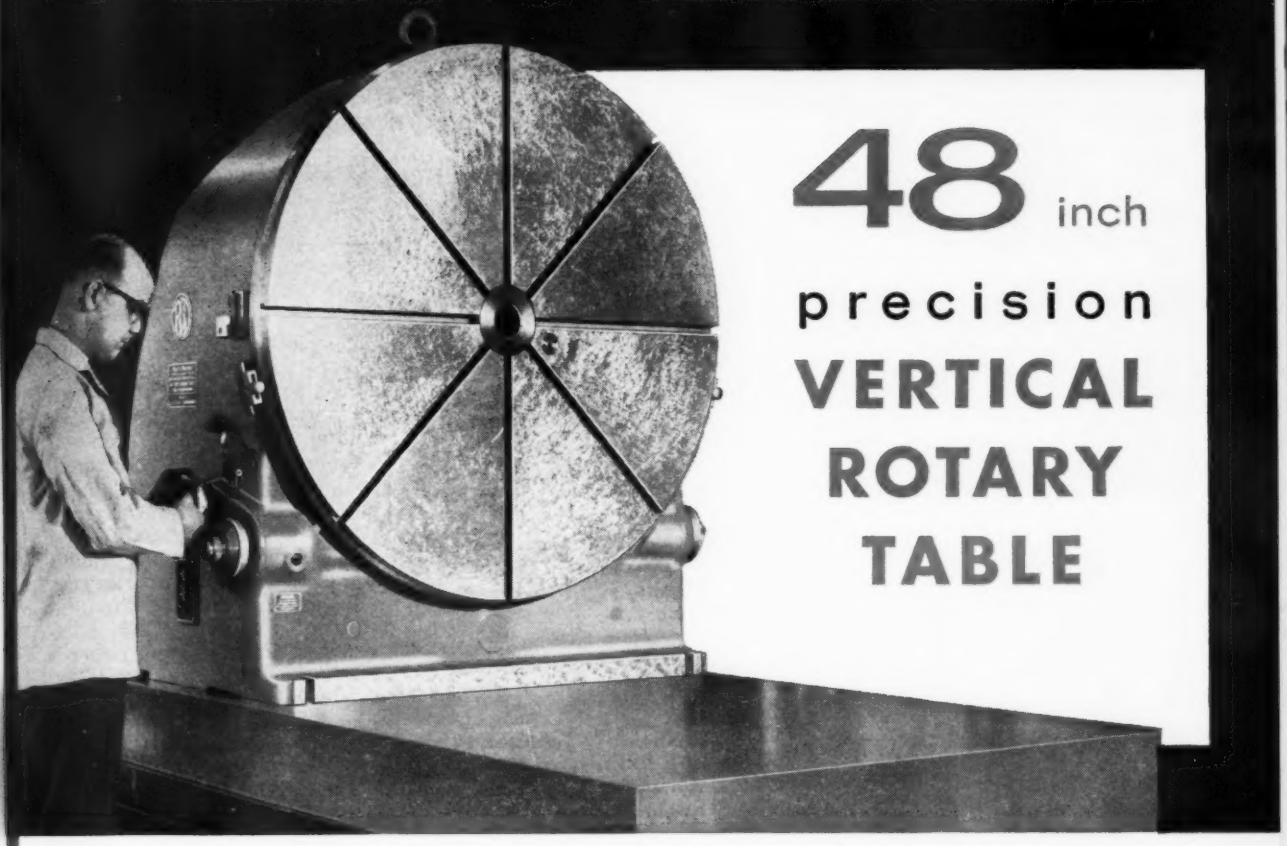


Grip-All Tractor

CIRCLE INFORM-A-GRAM KEY NO. 24

new PRATT & WHITNEY



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This rugged, new Rotary Table is designed especially for inspecting large, heavy work pieces . . . such as aircraft parts, machine elements, jigs, fixtures and other precision products . . . with speed, ease and accuracy. It can also be used to provide precise work location on heavy equipment for boring, face milling and other machining operations.

Table dial graduations read direct to 1 minute of arc, vernier graduations to **2 *seconds***. Fast power rotation, in either direction, is provided by a ¾ hp reversible motor. Like all P&W Precision Rotary Tables, this new 48" Model is hand scraped and inspected to rigid standards of accuracy.

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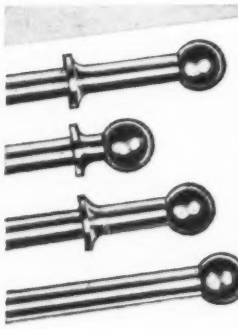

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Shown: Checking compound angles with tooling ball mounted in lathe fixture.

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Gages for Groove Location and Depth.

PRECISION GAGING EQUIPMENT

. . . Month's Talk, from page 19

Mr. Fairless, Chairman of the Board of U. S. Steel Corporation, in a recent speech called attention to the fact that in theory the dial telephone should have thrown thousands of telephone operators out of work—whereas the latest Federal Census, taken in 1950, shows that the number of telephone operators increased, during the previous ten years, to 159,000, or 79%.

You might think that tabulating machines would put bookkeepers and accountants out of work. But again, as Mr. Fairless pointed out, according to the U. S. Census, the number of accountants and auditors increased 71% in the 10 year period from 1940 to 1950.

Probably the most outstanding example of increased employment in relationship to increased mechanization is in the automobile industry itself. I know of no better example of the American philosophy of providing a good product on a quantity production basis within the cost range of the largest possible number of people. This has been made possible only by the utilization of equipment which increases productivity per man per hour — in short, by increased mechanization or automation, whichever you want to call it.

Let us take the union at its word for a moment, and turn back the clock. Let's say that we should abandon all methods of guaranteeing an annual increase in rate of productivity. Let's say that we should scrap today's approved means of production, and go back to producing automobiles by hand, one at a time. Somebody has figured out that by this method the average automobile would cost about $65,000. If that were the case, how much employment would the union think would still remain in the automobile industry?

Fred Crawford, President of Thompson Products, in Cleveland, had an interesting comment on this subject, in the Cleveland Plain Dealer. He was relating his experiences in talking to people in Europe, on a trip from which he had just returned. He said, and I quote,

"Many people abroad are sure that modern machinery will increase unemployment. I told them of my experience; 38 years ago when I first went to work,

. . . Continued on page 28

CIRCLE INFORM-A-GRAM KEY NO. 26

UNIVERSAL DRILL BUSHINGS OUTLAST THEM ALL!

Several factors contribute to the long life of Universal Drill Bushings. They are machined from an unusually high quality steel. Their superfinish bores reduce wear. The blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests help guarantee their accuracy and uniform quality. Knurled heads provide a quick, sure grip. Available in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis. — or our home office.

180

UNIVERSAL ENGINEERING COMPANY
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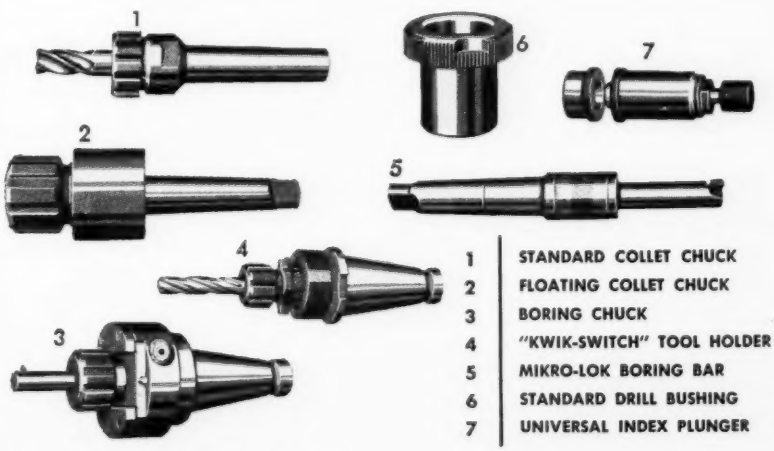
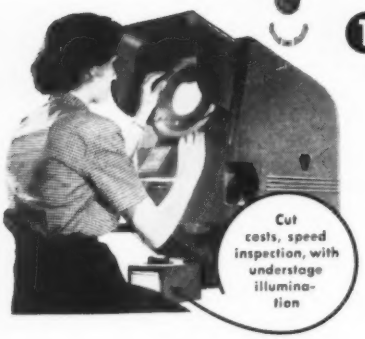


1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

CIRCLE INFORM-A-GRAM KEY NO. 27

3 EASY WAYS to boost production of precision parts



1 Bausch & Lomb BENCH COMPARATOR

Save inspection costs: no expensive holding fixtures needed for most work. Save time: no complicated set-up. Easy operation quickly provides vivid screen image, reveals costly production errors. Micrometer stage (optional) reads to .0001".

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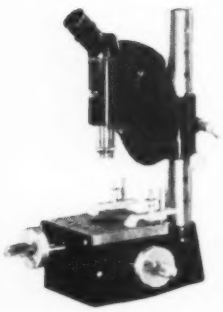
Quickly, easily shows sharp silhouettes or detailed surface views on 18" screen . . . for inspection, comparison, or highest precision measurements. Linear readings to .0001"; angular, to 1 minute of arc.



3 Bausch & Lomb TOOLMAKERS' MICROSCOPE

Quickly measures or inspects opaque or transparent objects of any contour. Linear readings to .0001"; angular, to 1 minute of arc.

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BAUSCH & LOMB SINCE B&L 1853

Quality Control INSTRUMENTS

CIRCLE INFORM-A-GRAM KEY NO. 28

. . . Month's Talk, from page 26

my company employed 200 workers. The bankers said costs had to be cut in order to avoid bankruptcy. This meant reduced employment and more labor-saving machinery. For 38 years we have been buying all the labor-saving machinery we could get our hands on in order to get rid of those 200 workers, yet today our employment is 25,000. That is the paradox of job-making so little understood around the world — make jobs by doing it by hand and employment falls. Add productivity-increasing machinery, get rid of people, and your employment climbs! . . ."

I want to repeat that last sentence of his—"add productivity-increasing machinery, get rid of people, and your employment climbs."

All of which means, simply, that the more you cut your cost, the better values you can offer the customer, the greater volume of business you can get under competitive system, the more people will be employed.

Never to my mind has there been such an example of confused and archaic economic thinking as that exhibited by the union. It mixes a plea for a guaranteed wage with a charge that better machines put men out of work.

Under our dynamic system of competition there is to my mind only one guarantee of steady employment. That is the guarantee of an annual increase in productivity, which will give the American consumer, each year, more for his dollar than he was able to get the year before.

That guarantee can be delivered only by the use of machines which multiply the output of the human hand and result in more output per man per hour.

Consistent progress in mechanization or automation, or whatever you want to call it, is imperative as a foundation of employment continuity.

The all-important thing to remember is that under our competitive economy, this process cannot stop. Our entire economic system is geared to the assumption that each year we must provide better things for more people, at lower cost than we did the year before. We are the only country in the whole world that has founded an economy upon

. . . Continued on page 32

A MILE OR A SLICE
of tool steel for you
IS IMPORTANT TO MILNE

Milne's favorite orders come in three sizes . . . small, medium and large. Across the continent, Milne has 40 saws cutting tool steel to your order, whether it's in pounds or tons.

And wherever you are, a Milne man is near you. There are 38 Milne tool steel specialists strategically placed to help you with tool steel problems and expedite your order.

Big or little, your order gets the maximum in Milne service.

ORDER
AMCOH Hollow die - Annealed - Spray Painted PINK for identification
1 Pc. 6" OD x 3" ID x 2" Long - 14 lbs.
ORDERED: 11/18/53 10 A.M.
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SHIPPED BY: Truck
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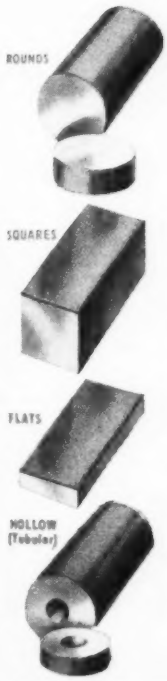

Wide range of sizes and grades in WATER HARDENING—NON-DEFORMING—SHOCK-RESISTING—HOT WORK AND HIGH SPEED TOOL STEELS

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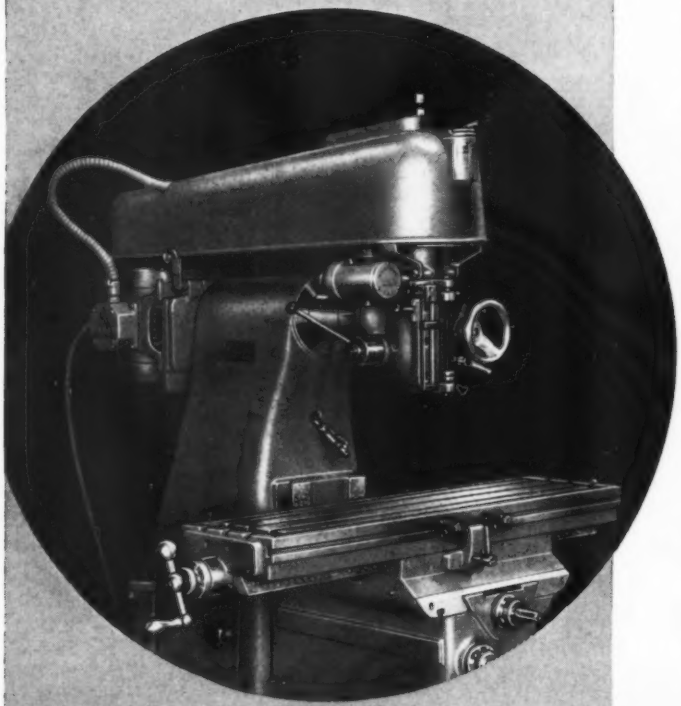
America's Leading Tool Steel Specialists
Complete Line Of Tool Steels—Hollow and Solid

CIRCLE INFORM-A-GRAM KEY NO. 29

does MORE work... MORE easily

new POWER FEED HEAD

U. S. Vertical Miller



Here's the new U. S. Vertical Miller with Power Feed Head – the head into which U. S. has built all the most wanted features without sacrificing traditional U. S. simplicity. Check its infinitely variable feed rate, its 800 pounds of down thrust on the quill, its supplemental hand feeds – it is the milling head that was designed to meet all shop needs.

Add to these the basic advantages of the U. S. Vertical Miller. You can easily see why it's the milling machine that "does more work more easily."

Detailed literature on request.
The U. S. Burke Machine Tool Division.
7 Brotherton Road, Cincinnati 27, Ohio.

more versatile
Feed infinitely variable from .002" to .008" while in operation

greater capacity
5½" power quill travel; 800 lb. down thrust

more convenient
Supplemental hand feeds

increased rigidity
Enclosed hard chrome plated quill with internal lock

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THE U·S·Burke MACHINE TOOL DIVISION

CIRCLE INFORM-A-GRAM KEY NO. 30

The BUY word for Socket Cap Screws is ALLEN

The *easy* way to make sure of greater strength, better fit and uniform quality in socket cap screws is to order "not just Allen-type but genuine ALLEN."

PRESSUR-FORMING

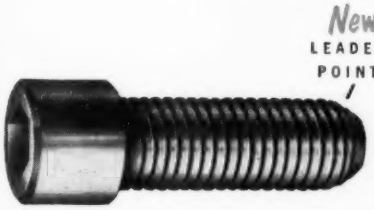
The latest improvement in the cold forging method originated by Allen. The tough Allenoy steel fibers are preserved continuous and uncut.

GRIP HEAD CAP SCREWS
The world's easiest starting, straightest driving, firmest holding cap screws.

FLAT HEAD CAP SCREWS
For firm fastening with flush surfaces. Especially adapted to fastening thin plates and sheets.

BUTTON HEAD CAP SCREWS
Produces smooth streamlined appearance where countersinking is impractical.

STAINLESS STEEL



Bright, non-corroding, high tensile strength type 18-8. 151 popular sizes (NC & NF) *available from stock.*

THE ALLENUT

Provides a ready-made threaded hole for use with cap screws in soft materials and for repair applications. Endless uses for compact design, space saving.

Sold Only Through Leading Industrial Distributors

Take advantage of their large stocks and fastener experience. Write direct for General Catalog G55.

ALLEN
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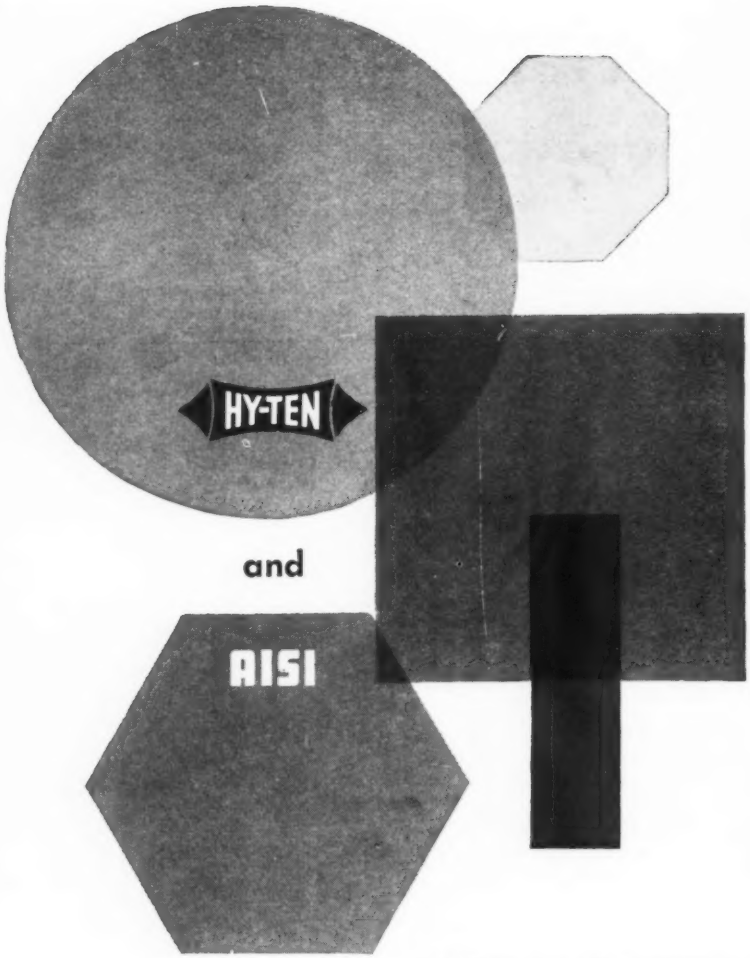
ALLEN HEAD

CIRCLE INFORM-A-GRAM KEY NO. 31



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Wheelock, Lovejoy & Company, Inc., can fill your alloy steel requirements promptly. This applies to both standard AISI and SAE steels and to our own HY-TEN steels – "the standard steels of tomorrow". Take advantage of our seven strategically located warehouses. All of them can supply these steels in the form and quantity you need. Every warehouse, too, is staffed with expert metallurgists who are ready to serve you.

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CIRCLE INFORM-A-GRAM KEY NO. 32

. . . Month's Talk, from page 28

the assumption of perpetual progress; and that progress is in turn founded upon a guarantee of an annual increase in rate of productivity.

All of us know this; all of us believe in it. Nevertheless, this concept is challenged today.

I want to urge everyone of you here to accept this challenge, and to make an answer to it.

I think the time has come when it is vital that we be articulate and outspoken in our philosophy, which is that of maximum productivity on behalf of the standard of living and the full employment opportunities of all of the people of the country.

We know that our philosophy has been proven by time and experience. The facts are on our side. It is up to us to present them to the American public.

But we should be more than that. We should take action to prove this philosophy.

That course of action is clearly indicated today. There are still in operation, in the metalworking plants of the United States, hundreds of thousands of antiquated, obsolete, almost worn out machine tools. These old machines represent high-cost production, by comparison to the productivity per man per hour that has been built into today's new models, largely by the progressive development of automatic controls.

These old machines are a drag upon the nation's economy. They act as a brake upon our cycle of perpetual progress. Everyone knows that sooner or later, they must be replaced. Most of them should have been replaced long ago. There never will come a better time to replace them than **right now,** before they do any further damage to our economy.

Here is one guarantee that can be made with full assurance. The machine tool industry can guarantee the metalworking industry of the United States that if it will undertake immediately a sound and comprehensive program of replacement of obsolete machine tools, the savings effected will total over a billion dollars a year, and, in addition, the net result will be an increase in over-all employment.

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★ MULTIPLE SPLINED SPINDLE

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★ PRELOADED SPINDLE (See Cutaway)

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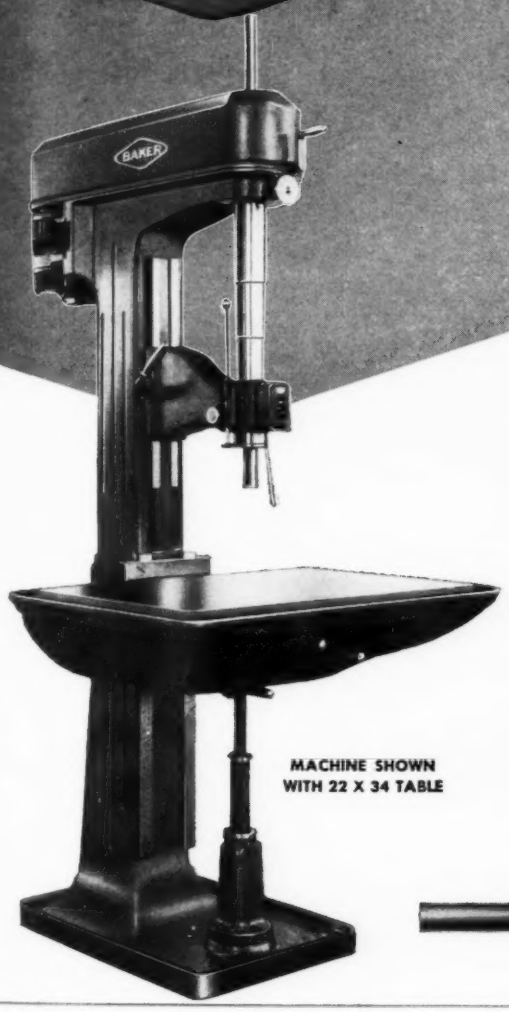


MACHINE SHOWN WITH 22 X 34 TABLE

The Baker line of drilling and boring machines is now more complete than ever before, with the addition of the new Baker Sensitive. Baker's 75 years of engineering experience in the drilling and boring field is now at your disposal in light-duty sensitive type units. The machine illustrated is *best* for light-duty drilling operations. Let Baker Representatives tell you how the Baker will save you money and put you ahead of competition.

Cutaway shows why the Baker spindle preloading prolongs drill life. Ball bearings also lengthen tool life. These, and many other features mean *money* to you.

GENERAL SPECIFICATIONS

KTVS VERTICAL MOTOR DRIVE

1" CAPACITY IN CAST IRON, ⅝" IN STEEL

Spindle centerline to column face	12"
Spindle speeds—with 1200 R.P.M. motor	275-1375*
Spindle travel	7"
Rack travel	10"
Table adjustment	32½"
Morse Taper in spindle nose	#2 or #3

*Speed adjustment between the lowest and highest speed is INFINITE through selector.

BAKER BROTHERS, INC.

TOLEDO, OHIO

DRILLING...TAPPING...KEYSEATING...CONTOUR GRINDING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 33

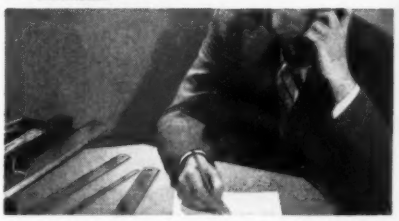
GOOD BLADES aren't made on GUESSWORK

that's WHY MILFORD Blades are FACTORY PRE-TESTED

No two lots of steel respond alike to heat treating, so MILFORD makes a complete metallurgical test of each shipment before it goes into production. Each lot must be specially heat treated to obtain a high hardness ***plus*** an optimum grain structure. Blades made from each lot of steel are tested again ***after*** heat treating. Finally, as a quality control follow-up, each blade is marked with a code number, key to its manufacturing history.

As a result we *KNOW* that into each MILFORD Blade is built maximum production performance. Try one and see . . . your local MILFORD Distributor will be glad to arrange a demonstration in your own plant.

WRITE FOR THE **MILFORD** CATALOG.



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SAVE TIME . . . *through local availability.*
CUT BUYING COSTS . . . *with one source of supply.*
REDUCE INVENTORY . . . *he carries the stock.*

THE HENRY G. THOMPSON & SON COMPANY
Saw Blade Specialists for over 75 Years
NEW HAVEN 5, CONNECTICUT

Profile Blades and Band Saw Blades • Hand and Power Hack Saw Blades

CIRCLE INFORM-A-GRAM KEY NO. 34

CUSTOMER SPECIFIED

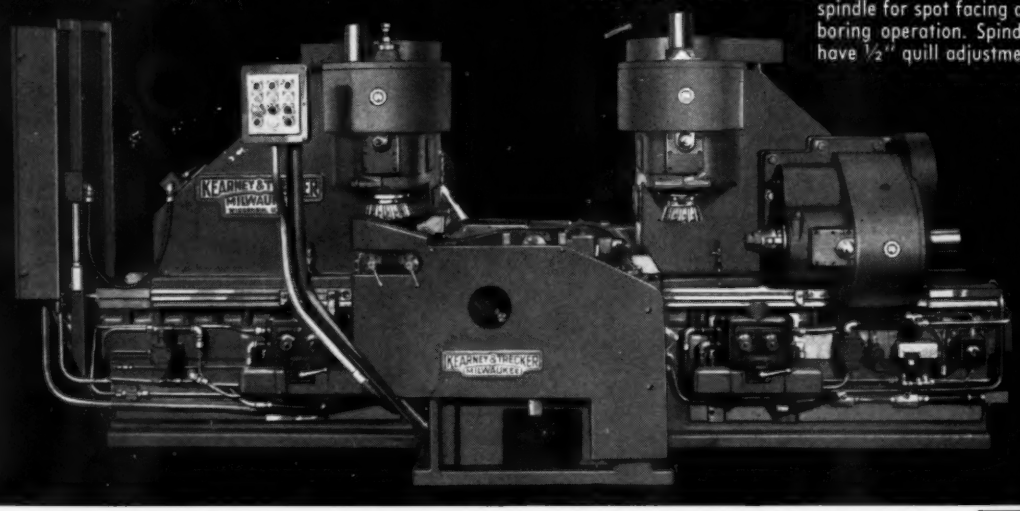
Leading farm machinery manufacturer asked Kearney & Trecker to design a machine that would bring new efficiency to the milling and boring of large tractor housings.

Black indicates machined surfaces.

KEARNEY & TRECKER DESIGNED

Kearney & Trecker built this special two-way boring and milling machine which simultaneously performs four operations on the tractor housing. Close tolerances were necessary not only in size but also in squareness of finished piece.

Left hand traveling head has two spindles—a horizontal for milling side flange and a vertical for milling top flange. Right hand traveling head incorporates a single spindle for spot facing and boring operation. Spindles have ½" quill adjustment.



New production efficiency starts with Kearney & Trecker Milwaukee machine tools

This typical example proves you can reduce costs and start on the road to higher production with machines designed and built by Kearney & Trecker's Special Machinery Division. With more than 50 years' experience in machine design and manufacture, Kearney & Trecker has all the ingenuity and skill required to solve special machining and production problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all details. Call him today!

For more details on the machine illustrated ask for Data Sheet No. 1015. The free booklet "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking.

Special Machinery Division

MILWAUKEE 14, WISCONSIN, U.S.A.

Builders of Precision and Production Machine Tools Since 1898

CIRCLE INFORM-A-GRAM KEY NO. 35

IT'S THE NEW, "YEARS-AHEAD" LINE...

Far out front on every point of comparison

COMPLETE LINE FROM 50 TO 775 TONS

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

NIAGARA

ALL STEEL PRESS BRAKES

"MULTI-MACHINE" VERSATILITY TO BOOST PRODUCTION

Practically limitless in their scope of forming, bending, punching, blanking and related operations, Niagara Press Brakes get more done for you because they do more jobs. One reason: Advanced design. Another: The extensive line of Niagara Press Brake Dies available.

UNIFORM BENDS WITH STRAIGHT-EDGE ACCURACY

Double end twin drives with double reduction gearing, *on all models,* provide uniform, constant application of power at both ends of the ram. Off-center loading presents no problem.

Rugged, streamlined frames feature box type crowns of unequaled strength and rigidity, assuring maximum resistance to deflection and permanent alignment of bearings and ram.

3-SHIFT STAMINA TO HANDLE WORK-HEAVY SCHEDULES

Close attention has been given to every design detail. Nothing has been overlooked. Each frame size has been scientifically tested to detect and eliminate harmful stresses at all critical points.

Laminated non-metallic ways, an exclusive Niagara feature, reduce wear to an absolute minimum, providing accurate alignment and longest possible service life. All gearing is totally enclosed in sealed oil baths for thorough, clean lubrication.

Once again, Niagara's forward-thinking engineering has produced a metal working machine years ahead of its time. As you become familiar with the significant developments embodied in this revolutionary new line of all steel press brakes, you will realize why it carries the Niagara nameplate. After all, who is more uniquely qualified to be its builder than the builder of America's most famed and most complete line of presses, shears, other machines and tools for plate and sheet metal work?

Call in your nearest Niagara representative at once. Let him tell you, *in detail,* what these great, new press brakes can do for you.

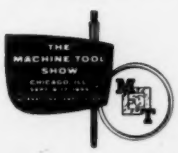
CHECK ALL THE FACTS, YOURSELF!

Compare. Make a careful, feature-by-feature appraisal of Niagara's years-ahead press brake design. Write for new Bulletin 89C . . . the most comprehensive press brake literature ever published.

NIAGARA MACHINE & TOOL WORKS
BUFFALO 11, N. Y.

DISTRICT OFFICES:
Detroit • Cleveland • New York • Philadelphia
Dealers in principal U. S. cities and major foreign countries

engineered to expand your output ...AT SAVINGS!



THE MOTCH & MERRYWEATHER CUTTING TOOL MANUFACTURING DIVISION

offers you . . .

cutting tool aids to production

ASK YOUR DEALER ABOUT EVERY ONE OF THEM

• Get the full story on Motch & Merryweather's complete line of saw blades and slitting-slotting saws — a type, size, and thickness for *every* purpose. Triple-Chip cut-off blades up to 108" diameter down to slitting saws 3" in diameter — special saws — for any machinable material, ferrous or non-ferrous, any size, any shape, any thickness. Ask how the M & M Triple-Chip Method reduces tooth strains, prolongs blade life and speeds production with accuracy.

KROSLOK® FACE MILLING CUTTERS and SHELL END MILLS

Simplicity itself!

Only 3 members — body, blade, wedge. Blade and body are serrated in two directions to prevent shifting of the blade in the body. Cuts any machinable material. A profit-showing investment in *precision* production milling.

TRIPLE C® GRINDING COOLANT

Clear — Cool — Clean!

Triple C® grinding coolant makes for improved results and lower costs on all wet grinding. Transparent, stable solutions; maximum cooling; grinding wheels stay clean and free-cutting.

TRIPLE-CHIP HEAVY DUTY ANTI-WELD SOLUBLE OIL

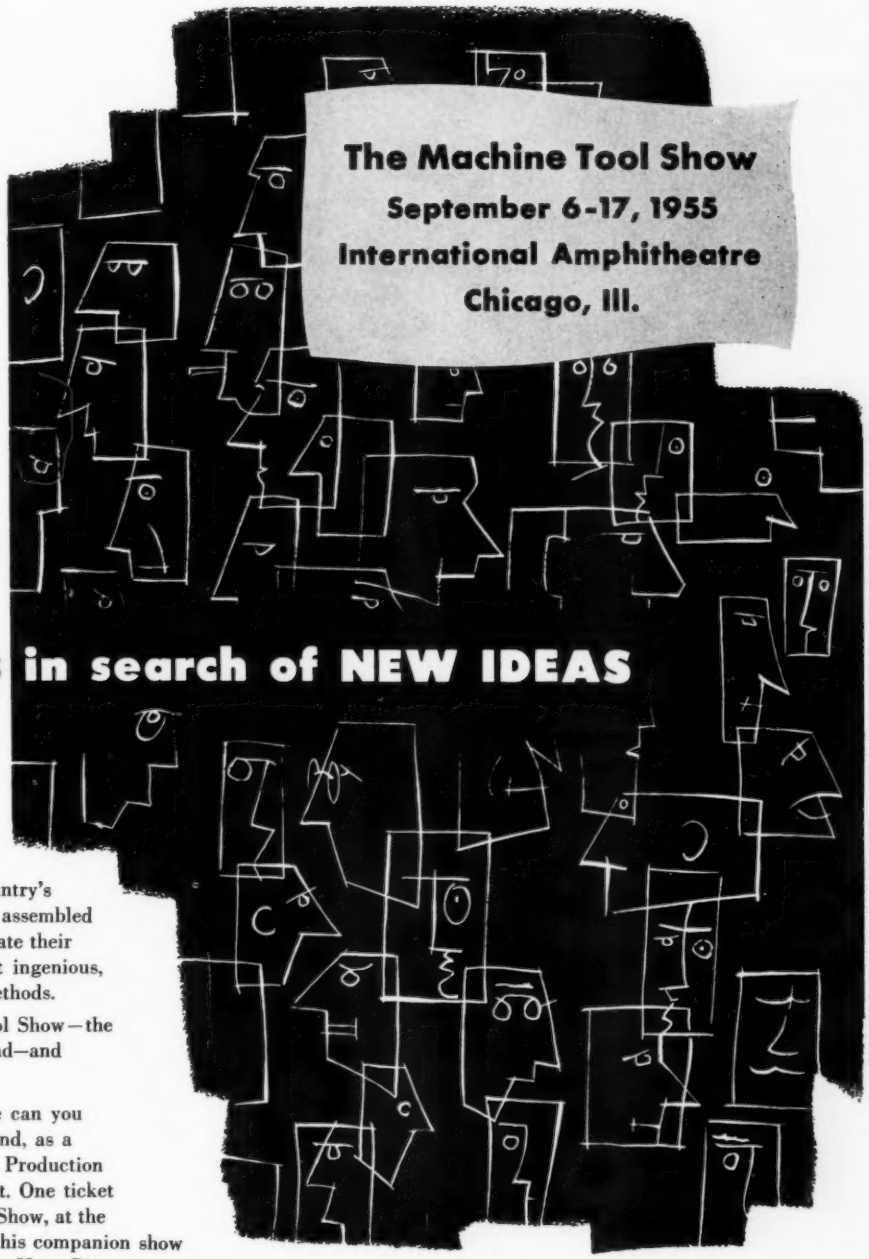
M & M Heavy Duty Anti-Weld Soluble Oil lengthens tool life, especially under severe conditions. Deters "pick-up", cuts rejects, is oily (not greasy), odorless; lowers production costs.

THE MOTCH & MERRYWEATHER MACHINERY CO.

Cutting Tool Manufacturing Division

1250 EAST 222nd STREET, CLEVELAND 17, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 38



18,721* engineers in search of NEW IDEAS

. . . and more than 150 of the country's leading machine tool builders, all assembled under one roof, ready to demonstrate their newest models, their fastest, most ingenious, most economical metalworking methods.

Where? At the 1955 Machine Tool Show—the largest, most important of its kind—and the first since 1947.

Plan now to attend. Nowhere else can you see so much in so short a time. And, as a bonus attraction, you can see the Production Engineering Show at no extra cost. One ticket admits to both: the Machine Tool Show, at the International Amphitheatre, and this companion show of machine tool accessories, on the Navy Pier.

If you're looking for new ideas, new ways to cut production costs, come to Chicago in September. The 1955 Machine Tool Show is the best chance you've ever had to see the world's best investment—*in action!*

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION
2071 East 102 Street · Cleveland 6, Ohio

*** Estimated Attendance, Before Receiving Your Reservation**

CIRCLE INFORM-A-GRAM KEY NO. 39

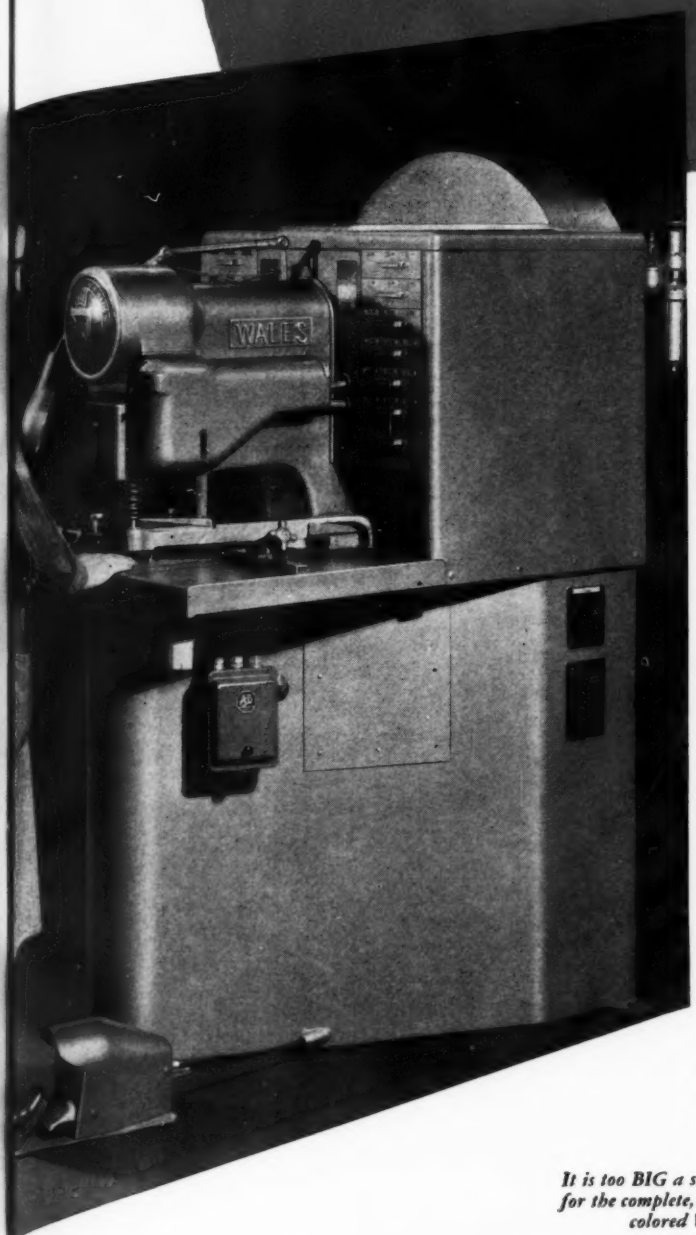
UNBRAKO AT WORK

FINISHING OFF WITH UNBRAKO FLAT HEADS. Holding a thin-section assembly together, and finishing it off with a smooth, good-looking surface is a job for UNBRAKO Flat Head Socket Cap Screws. These precision socket screws are designed for such applications. Heat treated alloy steel provides the strength. Uniform 82° angle under the head assures maximum contact. Accurate hex sockets prevent marring of the screw head or assembly surface. And these UNBRAKOS are easy to get—they are stocked by authorized industrial distributors everywhere. STANDARD PRESSED STEEL Co., Jenkintown 36, Pa.

UNBRAKO® SOCKET SCREW DIVISION **sps** JENKINTOWN, PENNSYLVANIA

CIRCLE INFORM-A-GRAM KEY NO. 40

HOW WALES Fabricators produce FASTER and GREATER SAVINGS...



NO OTHER MACHINE LIKE IT!

Rapid interchangeability of punches and dies for various hole diameters plus faster notching and nibbling operations provide the typical astounding time studies described below.

How long would it take you to make similar parts?

Wales Fabricator, the only machine of its kind, permits working direct from blueprints or operation sheets . . . *no templets required.*

ELECTRONIC CHASSIS 12½" x 11½", with 118 holes and 4 notches was completed including setup in only 32.45 minutes and subsequent pieces in

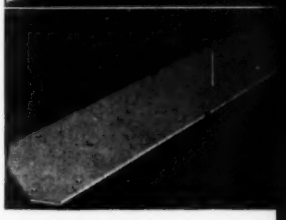
6.44 minutes.

A part of FARM EQUIPMENT, 72½" x 22" with 32 holes and nibbled cut out was finished including setup in only 12.01 minutes, subsequent pieces in

2.32 minutes.

AN AIRCRAFT part 7½" x 4½" with 15 holes and 1 notch was produced including setup in only 3.52 minutes and subsequent pieces in only

54 seconds.



Part of an ELECTRIC REFRIGERATOR, 39⅞" x 8½" with 10 holes and 4 notches was fabricated including setup in only 5.61 minutes and subsequent pieces in only

37 seconds.

It is too BIG a story to tell here so write today for the complete, fully-illustrated, functionally colored Wales Catalog 10-AA.

WALES-STRIPPIT CORPORATION

George F. Wales, Chairman

555 Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

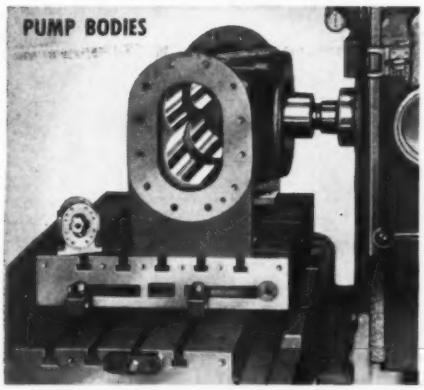
Wales-Strippit of Canada, Ltd., Hamilton, Ontario

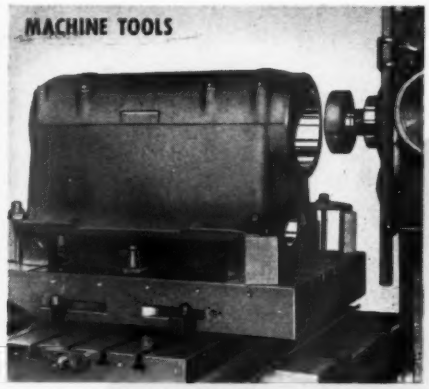
Specialists in Punching and Notching Equipment

The DeVlieg System of

*JIGLESS PRODUCTION

...eliminates expensive boring jigs!

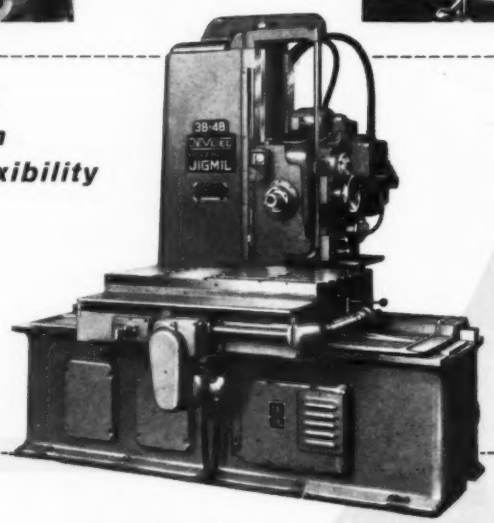




TYPICAL EXAMPLES OF JIGLESS PRODUCTION ON DE VLIEG JIGMILS

The JIGMIL Technique:

- ELIMINATES SPECIAL BORING JIGS
- REDUCES MACHINING TIMES
- PERMITS USE OF SIMPLIFIED TOOLING
- IMPROVES ACCURACY WITH RESULTANT CUT IN ASSEMBLY COSTS



The DeVlieg System of Jigless Production permits complete flexibility of product design!

If your shop is burdened with costly boring jigs and special tooling, it will pay you to investigate the

DE VLIEG *SPIRAMATIC* JIGMIL

**Come to Detroit—*

see a practical demonstration of the JIGMIL TECHNIQUE

Write for comprehensive Illustrated Catalog

DeVLIEG MACHINE COMPANY • 450 Fair Ave., Ferndale • Detroit 20, Mich.

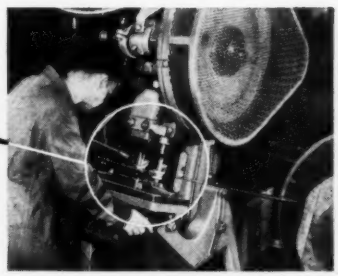
CIRCLE INFORM-A-GRAM KEY NO. 42

money saving

Accessories for your plant

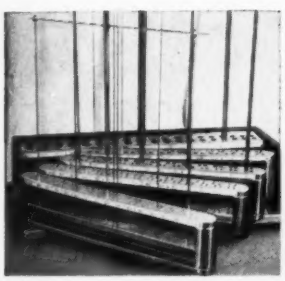
Each of the accessories illustrated and described below was designed and built for a definite need and used in our own plant before being offered to industry. They require a relatively small investment, yet will save you money every day. For further information, write for the folder offered below.

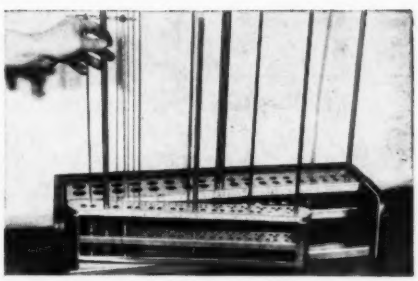
LEADER PIN OILERS



Eliminate wear on your die sets with these leader pin oilers. Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintain die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.

DRILL ROD RACKS



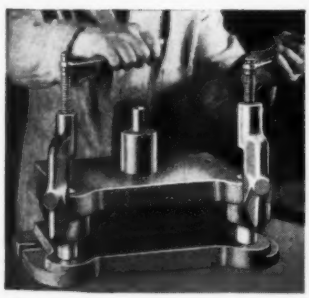


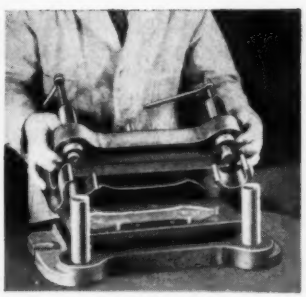
Eliminate trouble and waste effort with this modern method of storing drill rod. Put the Acro rack in a central location of each department and make it simple for each mechanic to select correct rod size in a hurry. It also provides a visual inventory for checking rod replacements.

Accommodates 26 letter sizes, 52 pieces; 47 fractional sizes, 138 pieces; 60 number sizes, 304 pieces. Fractional sizes graduated in 64ths from 1/32" to 1/2" and in 32nds from 1/2" to 1" included.

Also available in half size with fractions or numbers.

DIE SET PULLERS





The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers. Available in three sizes.

Free Data

covering each of these profitable accessories is included in our folder. Write for bulletin TP-55

ACRO

METAL STAMPING CO.

330 EAST RESERVOIR AVE.

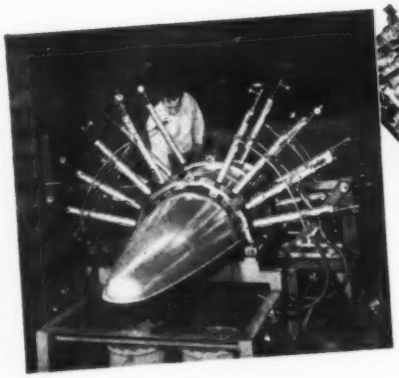
MILWAUKEE 12, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 43

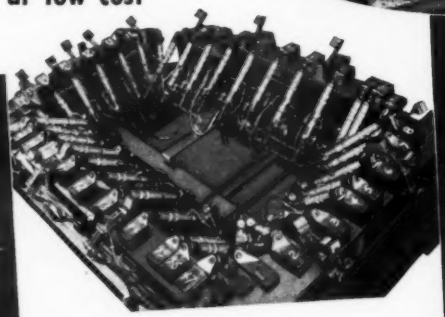
MULTIPLE DRILLING WITH KELLER "Airfeedrills"

Low investment and easy change-over make Airfeedrill setups the ideal way to make accurate holes at low cost

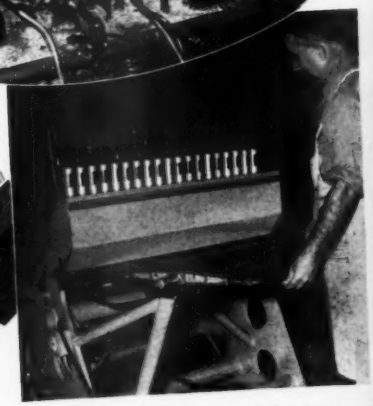
Eight Airfeedrills (four with dual spindles) drill 12 holes in 24ST aluminum part



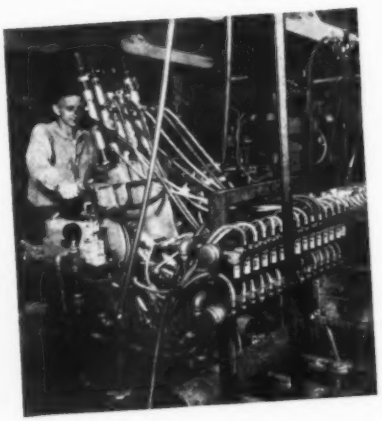
Sixteen holes made simultaneously on teardrop gas tank. Note the drilling angles



47 Airfeedrills on a single fixture for making trim holes in automobile roof panels



Fixture with 19 Airfeedrills used on guided missile fins at an aircraft plant



Fixture with 16 Airfeedrills used on section of automobile instrument panel

Here is the new way to handle multiple drilling jobs without investing in expensive machine tools. Simply build a fixture on which to mount Keller Airfeedrills . . . connect them with your air supply . . . and you are in business.

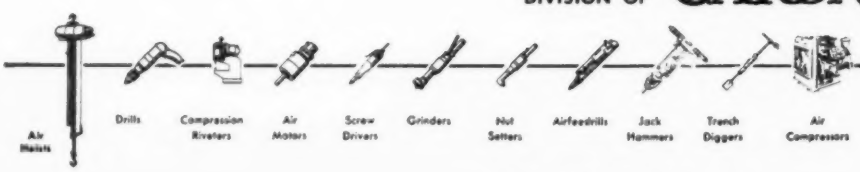
When the job has been run, the Airfeedrills are detached for use on another job. Where jobs are intermittent or short run, Airfeedrills permit high production where no other multiple drilling method would be economically feasible.

If you are not acquainted with the remarkable possibilities of Keller Airfeedrills, send for information without delay. Ask for Catalog Sections 92 and 92A.

KELLER "Airfeedrills"

KELLER TOOL

DIVISION OF **GARDNER-DENVER**



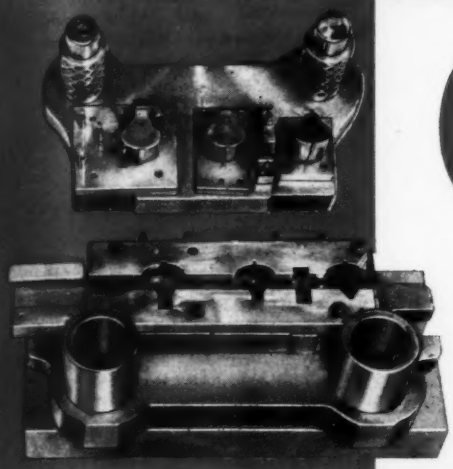
1313 Fulton Street
Grand Haven, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 44

Lewyt Corp. says...

"for long run dies we prefer...

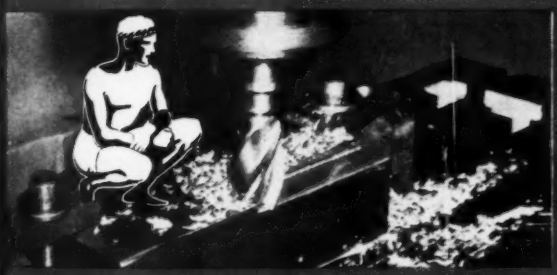
Olympic FM DIE STEEL"



● Olympic FM six-station progressive die with automatic feed—manufactures "damper cages" from .031 electro-galvanized cold rolled steel used in Lewyt Vacuum Cleaners.

Photos courtesy of Lewyt Corp. Brooklyn 11, N.Y.

Lewyt Corporation specifies Olympic FM because...



"... Olympic FM yields a superior machined finish ... does not tear."

"... Olympic FM machines much easier than other hi carbon-hi chrome steels ... increases tool life."

"... die performance is excellent."

Latrobe's new Olympic FM is a DESEGATIZED● High Carbon-High Chromium die steel which has given die makers improved machinability for thousands of long run tools and dies. Improved machinability is made possible through the addition of alloy sulphides uniformly dispersed by the DESEGATIZED● process of manufacture.

For easier machining and long-lived tools and dies, order Olympic FM die steel ... over 250 sizes regularly stocked at 10 convenient warehouse locations.

Branch Offices and Warehouses:

Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Hartford, Los Angeles, Milwaukee, Newark, Philadelphia, Pittsburgh, St. Louis, San Leandro, Toledo

Sales Agents:

Albuquerque, Charlotte, Dallas, Denver, Houston, Wichita, Windsor

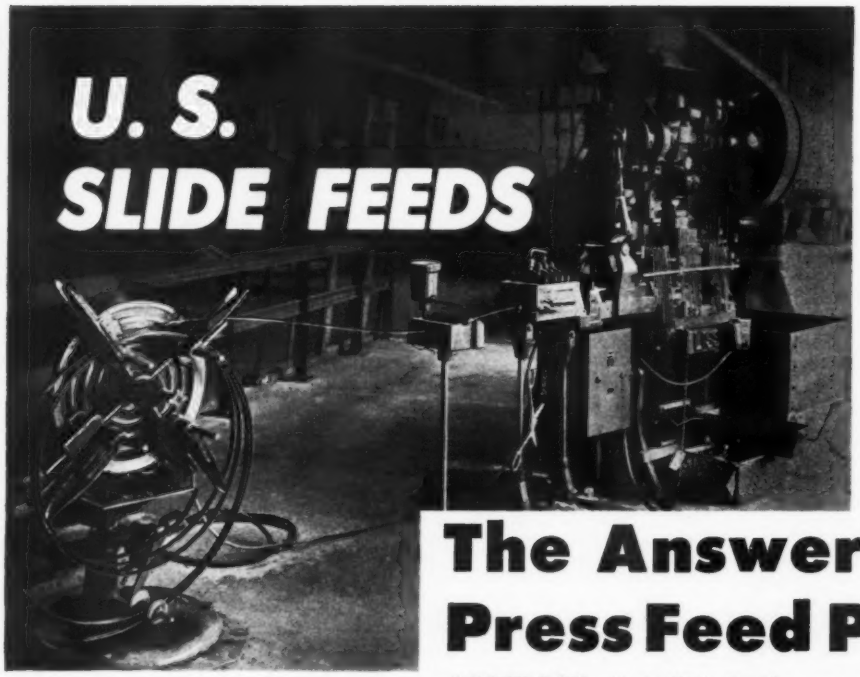
European Offices:

Brussels, Dusseldorf, Geneva, Madrid, Milan, Paris, Rotterdam, Vienna

LATROBE STEEL COMPANY

MAIN OFFICE AND PLANT

LATROBE, PENNSYLVANIA



Left: U. S. Slide Feed with Plain Straightener mounted on left-hand side of a conventional open-back press to feed from left to right. Also illustrated are a U. S. Combination Stock Oiler and Wiper, and Automatic Vertical Centralizing Type Stock Reel.

The Answer to Your Press Feed Problems

ACCURACY—U. S. Slide Feeds are recognized as the most accurate automatic feeds on the market for feeding material into punch presses. The slide block, which contains the blade to grip the material, reciprocates on hardened and ground slide rods between adjustable stops, insuring controlled accuracy of feed length.

VERSATILITY—They can be arranged for feeding left to right, right to left, back to front, front to back, etc. They can be used for feeding steel, brass, copper, aluminum, paper, cardboard, fibre, plastic, etc. in coils; or for butt feeding short lengths over .030" thick and of suitable stiffness.

AUTOMATIC OPERATION—The use of a U. S. Slide Feed converts the press into an automatic machine, resulting in reduced costs and increased production. All the operator has to do is thread and start new coils of material.

Write for Bulletin 80-P, giving details and specifications on the complete line of U. S. Automatic Press Room Equipment.

U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers
U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

Left: U. S. Slide Feed with U. S. Plain Straightener mounted for feeding right to left on press with crankshaft running from front to back instead of left to right, as on conventional presses. Also in photo is a U. S. Automatic Coil Cradle.

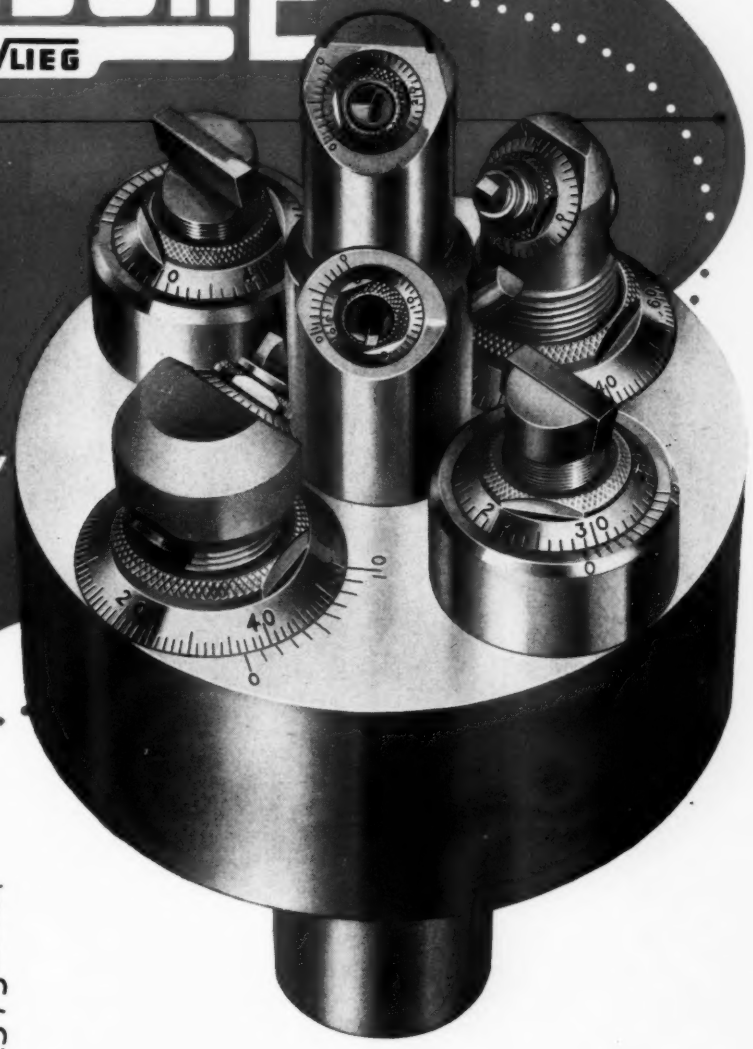
CIRCLE INFORM-A-GRAM KEY NO. 46

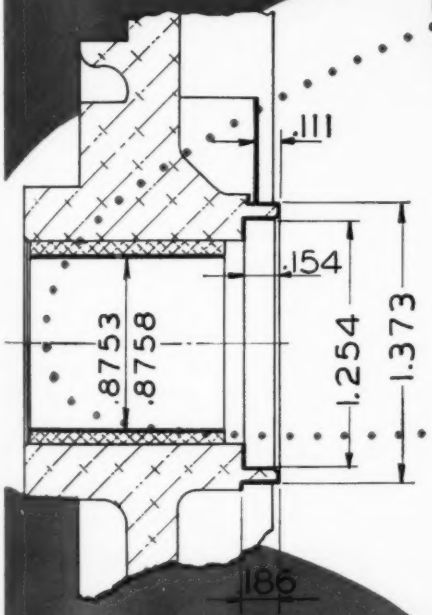
MICROBORE

by DE VLIEG

PATENT NOS. 2,230,882
2,537,517

. . . THE
Multi-purpose single point adjustable tool
for
PRODUCTION BORING, TURNING and FACING OPERATIONS.





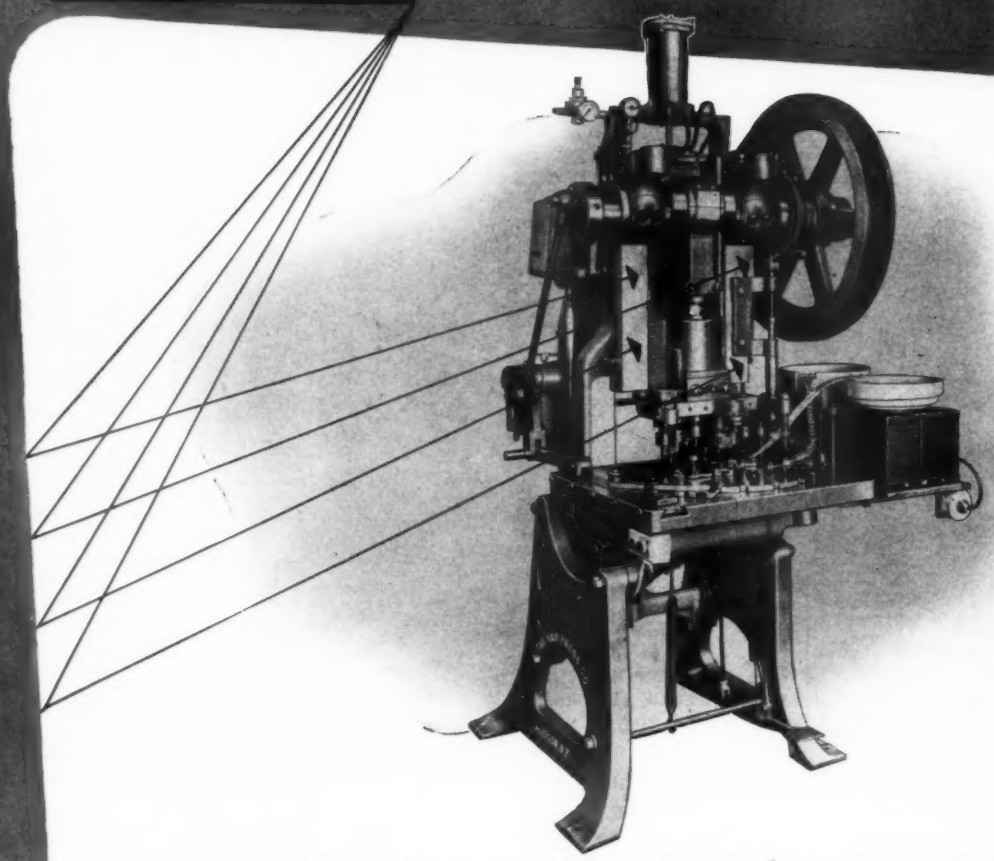
SURFACES MACHINED ARE INDICATED BY HEAVY LINES

Illustration shows typical example of cluster tooling using standard Microbore units for machining eight surfaces in a magneto plate at one pass. Each tool is independently adjusted by proven micrometer vernier principle and precise limits of accuracy are maintained on production runs.

DE VLIEG MICROBORE COMPANY
2720 West Fourteen Mile Rd. • Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 47

Precision presswork (AND COST REDUCTION) starts here where V & O leads



And has led for more than 65 years. Slide lengths in V & O's are two to three times longer than usual in O.B.I. presses. But that's only part of the story. To assure the full benefits of long slide precision, V & O builds the rest of the press to the highest machine tool standards. Slides and bearings are hand-scraped. The pneumatic clutch is the most advanced available. Rugged construction assures the extra-rigidity so essential to precision presswork.

For presses equipped and automated to perform specific jobs, consult V & O. For presses that are easiest for your own toolmakers to automate or equip, make sure they're V & O's.

Only the best is good enough

THE V&O PRESS COMPANY DIVISION
421 UNION TURNPIKE, HUDSON, NEW YORK

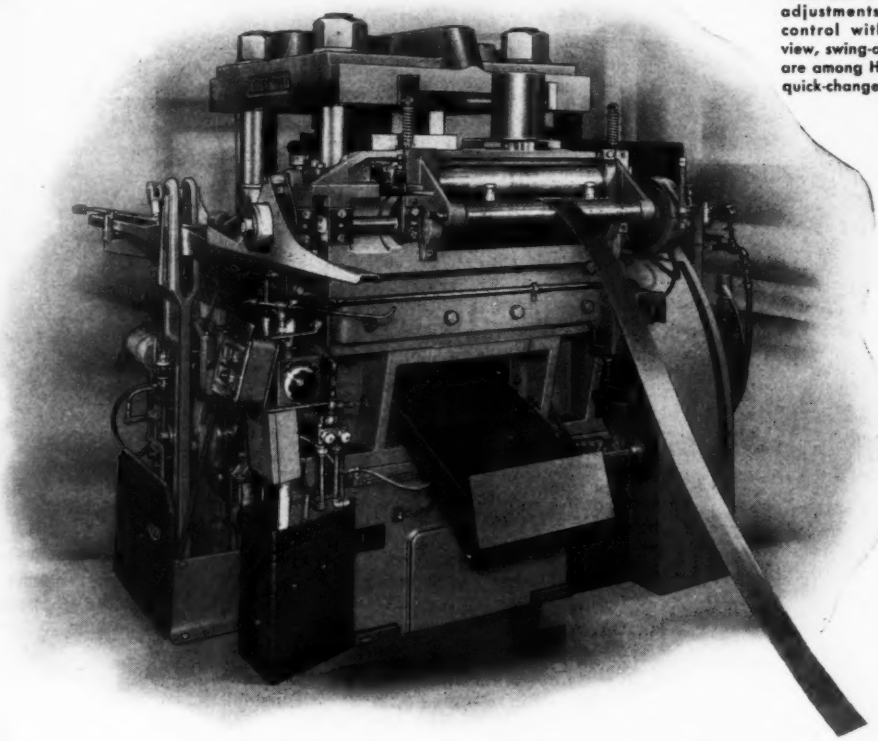
Our representative will be glad to give you the complete story about V & O presses and engineering services. For more information please write for our catalog.

EMHART

CIRCLE INFORM-A-GRAM KEY NO. 48

Two to three die changes a day

HENRY & WRIGHTS COMBINE HIGH SPEED OPERATION WITH HIGH SPEED JOB CHANGE



Open construction, easy-to-make shut height and feed adjustments plus inching control with die in full view, swing-away roll feeds are among Henry & Wright quick-change features.

As many as two to three job changes in a day are being made by companies taking advantage of the quick-change features of Henry & Wrights. These companies report sharply reduced costs on short runs. A contract plant said it had greatly improved its competitive cost situation and was re-bidding on jobs previously lost.

Their unique quick-change features are just some of the reasons why Henry & Wrights rate preference in modernization programs. Other advantages are high speed with minimum vibration, precise alignment of punch and die, quick-stop pneumatic clutch, overall rigidity—and the assurance of longer die life.

Only the best is good enough

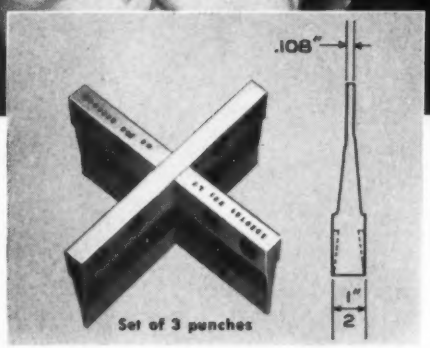
You owe it to yourself to get the complete story about Henry & Wrights and how they can improve your stamping methods. Our representative will be glad to give you the details.

HENRY & WRIGHT DIVISION
511 WINDSOR STREET, HARTFORD, CONNECTICUT

MFG. CO.

CIRCLE INFORM-A-GRAM KEY NO. 48

How One Toolroom Superintendent Used This Chart



Job: A set of three special punches used on a high speed machine to close the joints on prefabricated metal window frames made from ⅛" thick SAE 1010 steel.

Problem: Many types and grades of tool steels were tried, but all lacked the necessary toughness and hardening safety. Best service life from any before breakage was three days. Because a set of 3 punches cost hundreds of dollars to make, the low production was hiking up operating costs at a prohibitive rate.

Solution: In a final effort to find a steel with enough toughness and safety in hardening, the Toolroom Superintendent turned to Carpenter and the Matched Set Method. Carpenter R.D.S. (Oil-Tough) was indicated.

Results: Now punches stay in service for about three months, and instead of breaking, they wear out in service.

. . . To Hold Down Operating Costs

In working with many men responsible for tools and dies, we've discovered a simple but often overlooked fact: The man who approaches each tool and diemaking job with the idea of . . . *Simplifying* it, *Reducing* heat treating hazards, and *Improving* previous performance . . . is bound to do a better job.

If you or your men have that approach, Carpenter wants to be of help. We like to think of our association with customers as a "partnership" in a mutual effort to get best possible results. And here's what we offer: Practical, *workable* help at *every step* from diemaking, to heat treating, through on-the-job performance.

And that's why it works . . . both of us have a common goal. Just one example of hundreds is found in the Field Report shown to the left.

One part of this program is the Carpenter Matched Set Method. It is an accurate blueprint for selecting the *one* die steel ideally suited to give you the results you want. It is all outlined in a convenient, full-color Wall Chart available to you.

And that's only a part of the program . . . a program that involves almost 70 years' experience in the development of new and constantly-improved die steels. We're ready to work for you, now. Simply call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor. THE CARPENTER STEEL CO., 106 W. Bern St., Reading, Pa.

Carpenter STEEL — Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks

Export Department: The Carpenter Steel Co., Port Washington, N.Y.— "CARSTEELCO"

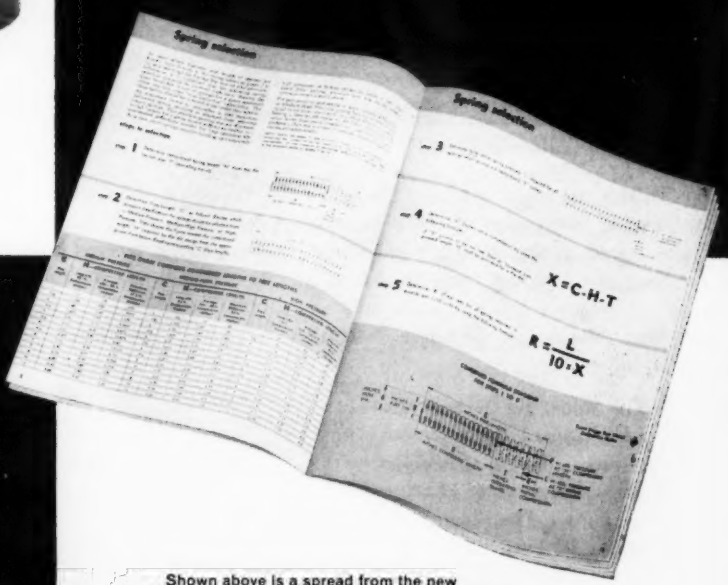
CIRCLE INFORM-A-GRAM KEY NO. 50

3 See Danly's New Die Spring Line...

COMPLETE PRESSURE RANGES TO CHOOSE FROM!

Now, you can design longer spring life into your dies. The new Danly Die Spring Line offers you 236 different springs to choose from—with the range of characteristics you've been looking for. Design of all springs in this new line is based on fatigue testing through millions of compressions at recommended loading and deflection.

Select the die springs you need from the new Danly line and get exactly the deflection, spring rate and size you want.



Shown above is a spread from the new Danly Die Spring Catalog—detailing the simplified spring selection procedure worked out for you.

Send For New Catalog...

The new Danly Die Spring Catalog makes selection of the right die spring easier than ever before. Contains complete pressure and deflection data, as well as dimensions. Here are some of the unusual features of this catalog:

- **New Method of Selection** . . . new "step-by-step" selection method simplifies choosing the proper die springs to meet any given problem.
- **Simplified Charts** . . . the regular spring tables are read "straight across" and contain complete details to minimize confusing cross references. Send for your FREE copy today.

DANLY®

DIE SETS . . .
STANDARD OR SPECIAL
DIEMAKERS SUPPLIES

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue • Chicago 50, Illinois

The Machine Tool The User Boasts About

ROYAL OAK
HAS THE
FACILITIES
THAT
PAY OFF
IN DIE,
JIG, GAGE
AND
FIXTURE
QUALITY
Jig grinding is an operation that enables Royal Oak to produce gages, jigs, and other precision work to closest tolerances and quality finish. This Moore Jig Grinder, with offset provisions and special attachments, grinds internal and external surfaces and contours.
ROYAL OAK TOOL AND MACHINE CO.
29800 Stephenson Hy.
Royal Oak, Mich.

REPRINT OF RECENT FRONT-COVER ADVERTISEMENT IN "TOOLING & GAGING"

The Moore Jig Grinder

Thumb through the next facilities booklet that comes across your desk . . . look at the trade journal advertisements stressing topflight facilities . . . chances are you'll see one or more Moore Jig Grinders featured prominently.

The Moore Jig Grinder has become the Cadillac of the toolroom (while remaining in a Chevrolet price range). It's a center of attraction on plant tours. The plant manager will point to it, beam like a new father showing snapshots of his offspring, and say: "And there's our Moore Jig Grinder!"

Why do so many users point with pride to the *Moore* Jig Grinder?

Because Moore invented the first jig grinder to relocate and grind straight and tapered holes to "tenths" in a fraction of the time required by other means.

Because the current No. 2 Moore Grinder extends this function to regular and irregular contours, making standard practice of former "trick" operations.

Because this machine employs the lead screw measuring system to assure accuracy, flexibility and speed.

Because electric heating elements and many other features have been designed into the Moore Jig Grinder to assure dimensional stability and wear resistance — and, consequently, *permanence* of accuracy.

Because it's the perfect partner for the popular Moore Jig Borer in achieving accuracy, speed and economies on countless toolroom and production jobs.

For complete information on the machine tool *the user* boasts about, write today for the Moore Jig Grinder catalog.

"HOLES, CONTOURS AND SURFACES
is bound to become a classic to the man or shop that does accurate work."
American Machinist Book Review
424 pages
$5 U.S.A., $6 elsewhere

Moore Special Tool Company, Inc.
726 Union Ave., Bridgeport 7, Connecticut

ADD MOORE TOOLS (SPEED - ACCURACY) TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 52

Will You Be There?

June 7-10. American Welding Society. Annual Spring Meeting and Welding Conference. Kansas City Auditorium, Kansas City, Mo.

•

June 7-Sept. 2. ElectroData Corp. 2nd Annual Computer Scholarship Course. Company Headquarters, Pasadena, Calif.

•

June 12-17. Society of Automotive Engineers. Summer Meeting. Atlantic City, N.J.

•

June 13-14. American Management Association. Special Manufacturing Conference. Hotel Commodore, New York, New York.

•

June 14-16. American Institute of Electrical Engineers, American Physical Society, and American Institute of Mining and Metallurgical Engineers. Magnetics Conference and Exhibit. William Penn Hotel, Pittsburgh, Pa.

•

June 14-17. Cornell University. 2nd Annual Industrial Engineering Seminars. Ithaca, New York.

•

June 20-23. American Society of Mechanical Engineers. Semi-Annual Meeting. Statler Hotel, Boston, Mass.

•

June 20-23. American Electroplaters' Society. 42nd Annual Convention & Fourth Industrial Finishing Exposition. Public Auditorium, Cleveland, Ohio.

•

June 26-July 1. American Society for Testing Materials. Annual Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J.

•

July 12-14. Western Plant Maintenance Show. 2nd Annual Engineering Show and Conference. Pan Pacific Auditorium and Ambassador Hotel, Los Angeles, Calif.

•

July 28-30. National Tool & Die Manufacturers Association. Summer Board Meeting. King Edward Hotel, Toronto, Canada.

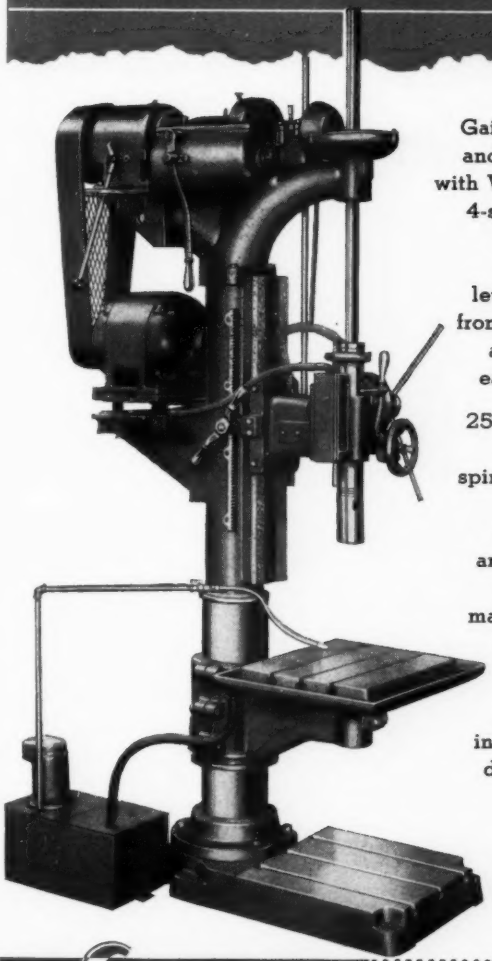
•

Aug. 22-23. Stanford Research Institute and National Industrial Conference Board. Symposium. Electronics in Automatic Production. Sheraton-Palace Hotel, San Francisco, Calif.

NOTICE

The New

SIBLEY MODEL D DRILLING MACHINES in 24" and 28" SWING



Gain greater productivity and operator efficiency—with V-belt drive direct to a 4-speed geared transmission, controlled by a conveniently located lever. 4-station switch at front of machine includes an "inching" button for easy change of speeds.

25" head travel on hand-scraped column; 11" spindle feed; 1-3/4" drilling capacity in mild steel. The heavy table arm assures rigidity and swings on column, to make the machined base accessible for a working surface.

Standard equipment includes automatic spindle stop; geared power feeds; back gears.

Model D-24 Drilling Machine is illustrated complete with coolant pump and fittings, electrical reversing, 5 H. P. motor, magnetic starting switch, and rectangular oil groove table.

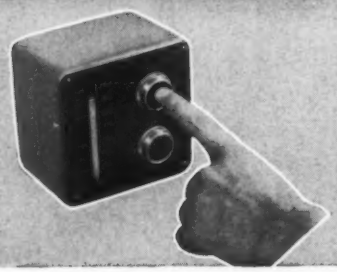
SIBLEY MACHINE & FOUNDRY CORP. SOUTH BEND 23, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
Dept. TP-6, South Bend 23, Indiana
Send Catalog No. 68 A
Name_____ Title_____
Company_____
Address_____
City_____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 53

HARDINGE
ELMIRA, N.Y.

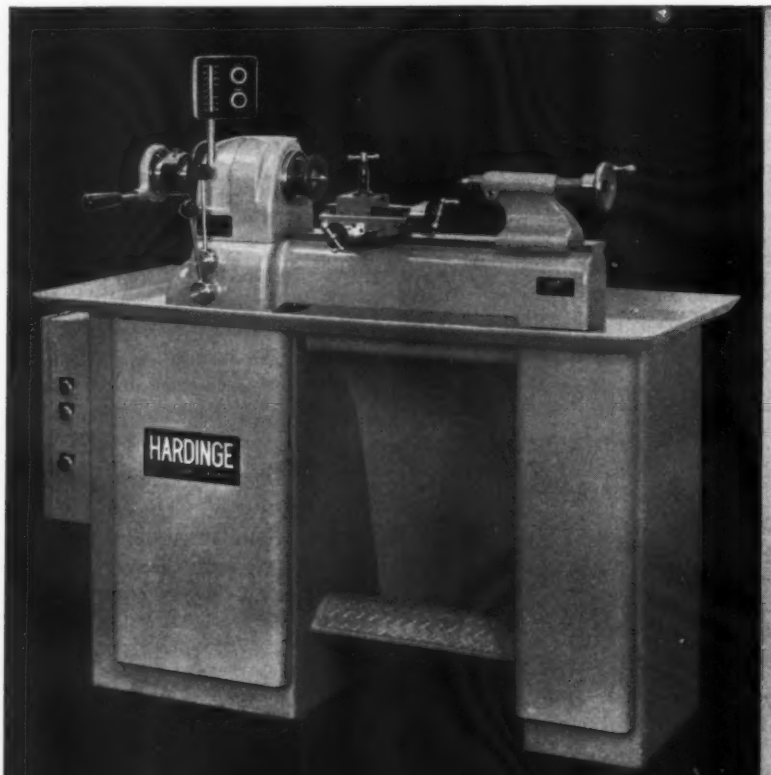
NEW Lathe with Variable Speed for Tool Room—Development—Production Work



Simply Push a Button for Exact Spindle Speeds

It's the NEW Simplified Design

EASY AND CONVENIENT TO OPERATE



FEATURING:

- Infinitely Variable Speeds 230 to 3500 r.p.m.
- Fast Lever Operated Collet with 1 1/16" Capacity
- Hardened and Ground Steel Dovetail Bed Ways
- Patented Positive Lock Slide Rest
- Full Bearing Tailstock
- And Other Cost Cutting Features

For Complete Information on this Precision Lathe Write for Bulletin DV59

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 54

Fast, low-cost tooling with compounds based on BAKELITE Epoxy Resins

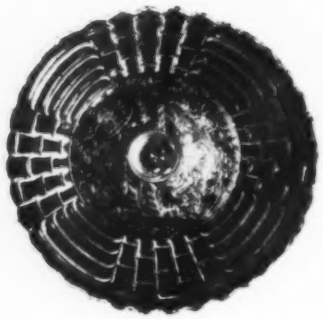
Frequent model changes and tough competition demand quick tooling at less cost. Look into these advantages of BAKELITE Brand Epoxy Resins for metalworking tools:

- **Liquid compounds—can be cast to shape without pressure**
- **Cured at room temperature—no applied heat**
- **Minimum shrinkage—minimum finishing**
- **Excellent flexural, compression, and impact strengths**
- **Outstanding dimensional stability**
- **Light weight means easy handling**
- **Laminated with glass cloth to form jigs, spotting racks, fixtures, and Keller models.**

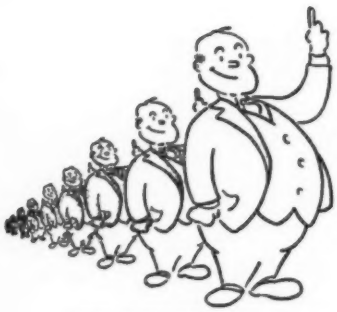
BAKELITE BRAND EPOXY RESINS

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC
CIRCLE INFORM-A-GRAM KEY NO. 55

Tracer Controlled Machining as Applied To Ceramics



Precision Duplicating in its most artistic design. A Walker Duplicator Machined the Molds for this glassware.



MR. DUPLICATOR

MR. DUPLICATOR SAYS — "Walker, during one of my visits I discussed ceramics with one large manufacturer and the tableware that I saw, in its design, was exquisite. Walker, do your Duplicators come into this picture in any way?"

WALKER SAYS — "In making molds for glassware in the ceramic industry many unique methods of duplicating patterns and forms are used. Most of these controls are made by clever mechanics using their own ideas. Definitely, for a manufacturer of duplicating equipment, a better and more accurate method according to these mechanics, just is not to be found. But the Walker Hydraulic Duplicator designed for the lathe, to duplicate from a revolving model, is more accurate, more versatile, and has better engineering than any of these homemade arrangements. Due to the fact that we have visited many of these mold shops and have seen the methods and arrangements being used allows us to speak emphatically. With Walker Hydraulic Duplicators, fine, sharp details are brought out very clearly and accuracy is beyond question. Note the delicate, precise, and clear patterns in the photos. This is true duplication."

We engineer and build a revolving head to be put on your lathe in your shop. Your heaviest mold can be used as a model. Precision bearings of the heaviest sizes are used and blends in with the good engineering already built into your lathe. We have been building Duplicators for approximately 25 years for all types of machinery. This is just one of the many styles of Duplicators we have built.

At present we are running through our shop a Duplicator for one of the largest milling machines ever built, and we state here that the largest or the smallest machine tools can have a Walker Hydraulic Duplicator built for it, where tracer controlled machining is desired. We have tie-ins with many machine tool manufacturers whereby your new machine can be equipped with a Walker Hydraulic Duplicator. Build now for your future. The first Duplicator that we built 25 years ago is still in operation and duplicating accurately. We have representation in principal industrial areas and a demonstration can be arranged for you to see a Walker Duplicator working under actual shop conditions, probably next door to you. Your inquiries are solicited! Write or call us today! Phone: Standish 7871.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL AREAS

Walker HYDRAULIC DUPLICATOR CO.

P. O. Box 470 STANDISH, MICHIGAN

Pioneer Designers and Builders of Precision Duplicating Equipment

CIRCLE INFORM-A-GRAM KEY NO. 56

for all your die set needs . . .

SUPERIOR
PRECISION ALL-STEEL DIE SETS

with Exclusive Safety and Handling Features!!!

For 30 years Superior engineers have directed their efforts to improving die set designs both in precision quality and ease of handling. In the process they have pioneered many firsts and today set the standard for specially designed safety features that speed production by eliminating unnecessary handling. Among the exclusive Superior innovations are the Safety Flange, Lock Jaw Lifting Device, and E-Z Lift Sling Chain. Prove to yourself how these unique safety features can speed your production astonishingly, while maintaining highest precision standards.

Send for FREE Catalogue containing helpful data on Superior Die Sets and Die Makers' Supplies.

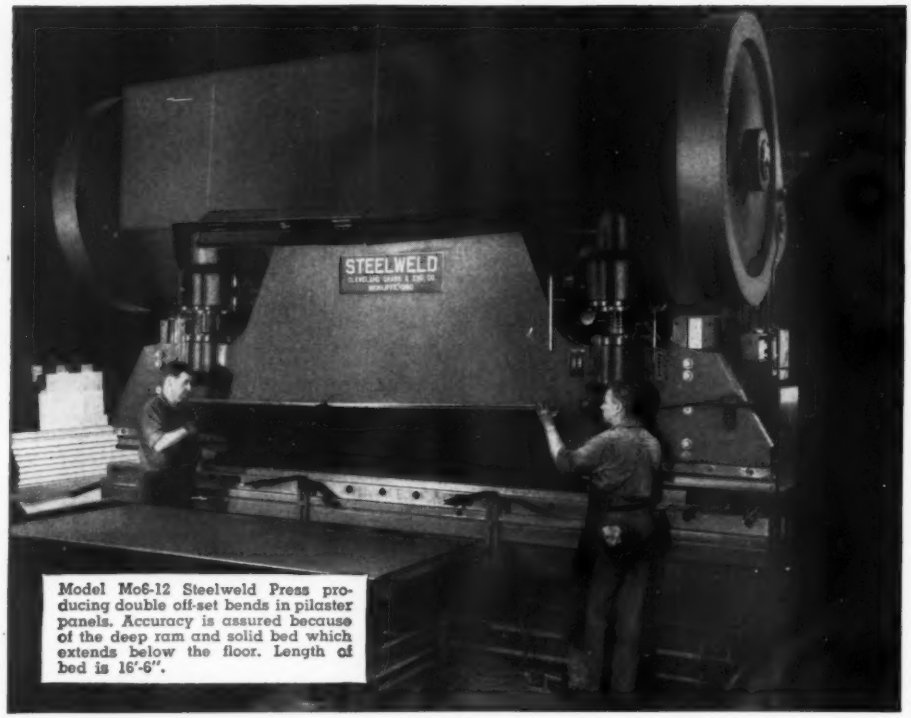
For Fast Local Service Call these Expert Superior Representatives

- Kalamazoo, Mich. Phone 5-7988
- Indianapolis, Ind. BRoadway 5668
- Chicago, Ill. RAndolph 6-8871
- Dallas, Tex. Riverside 5138
- Rockford, Ill. Phone 3-3932
- St. Louis, Mo. JEfferson 5-1223
- Milwaukee Mitchell 5-6027
- Dayton, Ohio Hemlock 6209
- Memphis, Tenn. Phone 33-7727
- Cleveland, Ohio KEnmore 1-2015
- Eau Claire, Wis. Phone 2-3453
- St. Paul, Minn. PRior 6485
- Winter Park, Fla. Phone 5-0464
- Boston, Mass. HUbbard 2-3373

SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 57

Special Press features
SPEED PRODUCTION



Model Mc6-12 Steelweld Press producing double off-set bends in pilaster panels. Accuracy is assured because of the deep ram and solid bed which extends below the floor. Length of bed is 16'-6".

It takes power to make long sharp bends. It takes size and design to assure accuracy. The Mills Company, Cleveland, Ohio, well-known manufacturers of fine metal partitions achieve both with their big 500 ton capacity Steelweld Press.

But more! They also obtain speed and safety. Their machine is provided with several features that are extremely advantageous:

1. Air-electric control for high production.
2. Electric foot switches for easy fatigueless operation.
3. Ram-positioning selector for stopping ram automatically at pre-selected points.
4. Two speeds, 7 or 21 strokes per minute for best operating speed.
5. Reversing flywheel for quick stopping or reversing of ram at any point.
6. Safety dual control permitting operation only when both operators are ready.

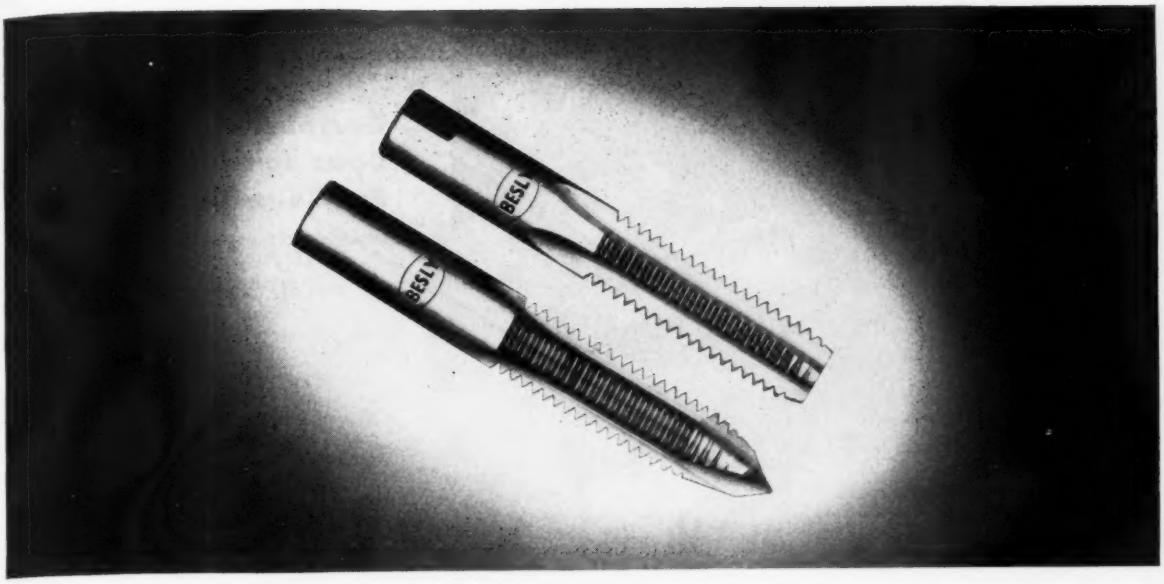
The Mills Company are proud of their modern Steelweld Press. It is the largest of several press brakes in their plant. It is in continuous operation, two shifts a day.

GET THIS BOOK!
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
8720 EAST 281st STREET, WICKLIFFE, OHIO

STEELWELD
BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

CIRCLE INFORM-A-GRAM KEY NO. 58



New Besly Stub Tap for Screw Machines

SAVES SET-UP TIME • FITS STANDARD BUSHINGS • HAS STRONGER SHANK

Available at No Extra Cost from BESLY

A new, shorter length tap that need not be altered before use in screw machines has just been made available as a standard item by Besly-Welles Corporation. Developed in cooperation with the National Screw Machine Products Association, the new tap conforms to standards recently drawn up by that group.

SHORTER SHANK, SHORTER THREADED PORTION

The shank (and threaded portions in larger sizes) of the new Stub Tap have been shortened to enable it to fit into the space between the spindle nose and tool holder of screw machines. In the past, it has been necessary for users to cut off part of the shank and even part of the threaded portion of standard hand taps to fit them into screw machines . . . or order higher priced "specials." Now, screw machine operators can save set-up time by using the new Stub Tap just as it comes in the package.

SIMPLIFIES BUSHING INVENTORY

The shank of a Stub Tap is the same size as its nominal O.D. This permits standard sized bushings to be used and reduces bushing inventory problems. The full diameter shank provides greater strength than standard hand taps which have shanks usually turned down in the larger sizes.

FACTORY-PERFECT ACCURACY

The shank of the Stub Tap is made concentric with the threaded portion, assuring accurate alignment in the tool holder. Since it is not necessary to cut off the forward threaded portion of a Stub Tap, chamfer and back taper are maintained factory-perfect. Squares, except for two small driver flats at the end of the Stub Tap, are eliminated. This permits better holding power, better alignment and longer accuracy.

FAST DELIVERY FROM STOCK

Complete stocks of the new Stub Tap will be on hand at Besly distributors by June 1. Users will be able to get the same fast delivery on Stub Taps as they have on other Besly standard taps.

AVAILABLE IN SIZES THROUGH 1-IN.

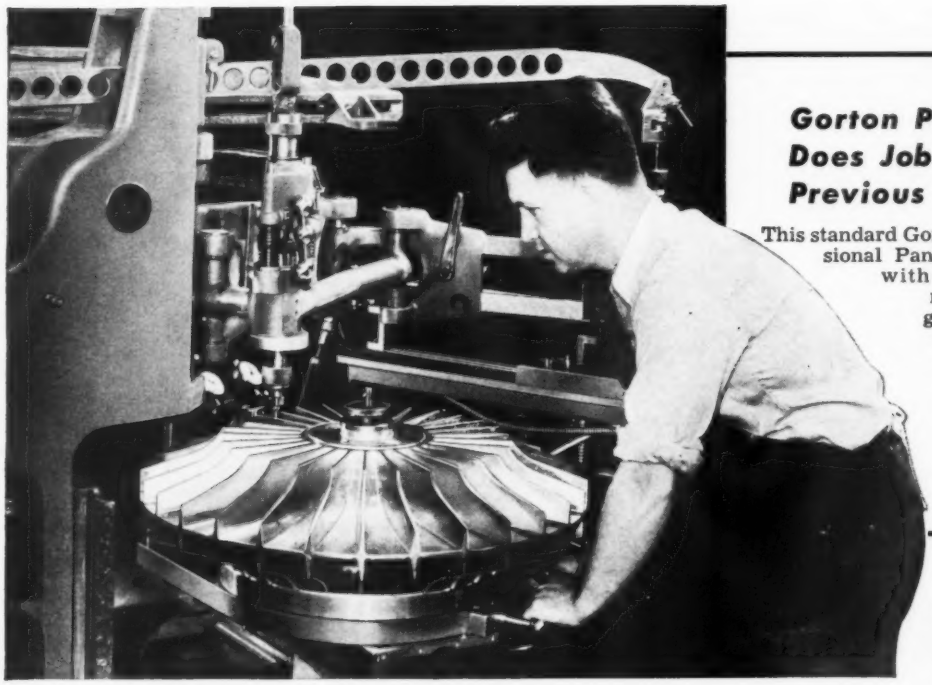
The new Stub Tap is made in fractional sizes from 1/4-in. through 1-in. and in machine screw sizes from #0 through #14. A bulletin describing the new Stub Tap and giving the standards applicable to it is available at no cost or obligation. See your Besly distributor or write or call:

BESLY-WELLES CORPORATION
Establi-hed As Charles H. Besly and Company in 1875
128 Dearborn Ave., Beloit, Wis.
Telephone: DUnkirk 9-2231
In Chicago: 184 North Wacker Drive
Telephone: FRanklin 2-1222
In Cleveland: 1474 Lakeside Avenue
Telephone: PRospect 1-6250
In Detroit: 16509 Meyers Road
Telephone: UNiversity 3-4805

BESLY HAS THE COMPLETE LINE

Order *all* of your cutting tool needs for your screw machines from your Besly distributor—your quality source for a complete line that means long life, accurate cutting and lower tool costs.

CIRCLE INFORM-A-GRAM KEY NO. 59



Gorton Pantograph Does Job in 1/5 Previous Time!

This standard Gorton P2-3 2-dimensional Pantograph, equipped with special tooling, mills 58 key lock grooves in a heat-treated aluminum alloy forging. In only 58 minutes it does a job that previously required five hours.

GORTON Pantography Means Creative Production

What's *your* problem in machining? Gorton Pantography may help you *create* a new or better production method if your problem falls into any of these categories:

OPERATIONS

INSIDE PROFILING	COUNTERBORING
OUTSIDE PROFILING	CHAMFERING
ROUTING	GROOVING
DIE SINKING	GRADUATING
MOLD CUTTING	ENGRAVING

MATERIALS

FERROUS METALS — NON-FERROUS METALS — PLASTICS

SHAPES

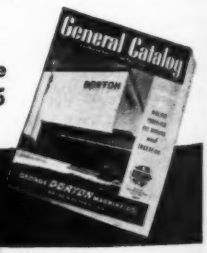
FLAT	UNIFORMLY CURVED
CYLINDRICAL	SQUARE
SPHERICAL	IRREGULAR

Gorton 3-dimensional Pantography operates vertically and horizontally in combination. It uses enlarged masters, templates or patterns—easily and inexpensively made. Normal operation applies the reduction ratio principle for increased work-piece accuracy —an exclusive Pantograph benefit.

Whether a dozen or a thousand pieces, each is identical in shape and tolerances to the first. Operation during cutting cycle is manual or automatic, and work pieces vary from dime size to areas as large as ten feet.

If you have a production problem, describe it in a letter and let Gorton engineers demonstrate the service that has helped many other manufacturers. No obligation.

Write for complete Catalog 1655-1206



GORTON

GEORGE GORTON MACHINE CO.

1206 RACINE ST., RACINE, WISCONSIN, U. S. A.

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

A 8384

CIRCLE INFORM-A-GRAM KEY NO. 60

Talking About Die Sets

WITH
PHIL MARSILIUS
Vice-President
The Producto Machine Co.

Steel vs. Semi-Steel—What should your choice be when selecting a catalog die set? Quite often, the answer is a matter of dollars and cents. Naturally, you'd like to tool-up as inexpensively as possible but you must also be sure that an initial savings will not result in excessive replacement costs later on. In making a choice, the complete cost of tooling-up and maintenance during operation should be considered along the following lines:

Initial cost of either type;
Cost of machining either type;
Unit cost of die set per part produced;
Replacement cost in event of damage.

Taking each point individually, if two dies are identically made, except that one is mounted in a semi-steel die set and the other in a steel set:

The semi-steel set will cost less, machine easier, and have a lower cost per unit produced, if not replaced due to damage;

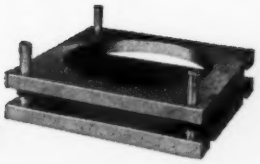
The steel set will cost more and require more machining time but may reduce the probability of breakage if excessive machining is performed on the die bed, and thus reduce the unit cost per part produced.

In general, for the average stamping operation, with all points considered, a semi-steel set is probably more economical. For heavy stamping operations, or for those that will run for a long time, a steel set would be the more practical. Either type can be purchased in the two grades of accuracy—Master-Precision and Commercial.

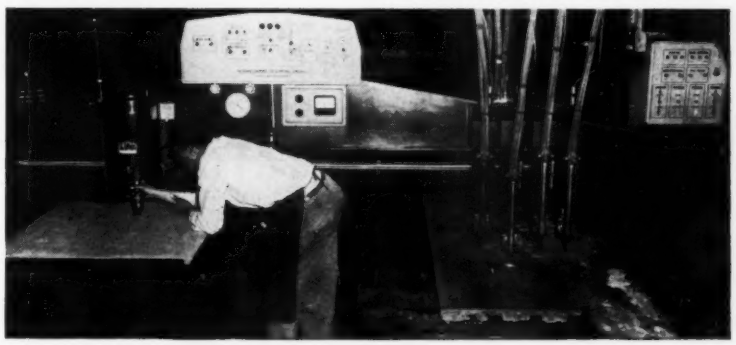
Where the advantages of a steel die set are desired and the savings of a semi-steel set are important, a combination of semi-steel punch holder and steel die holder offers an obvious, though seldom considered, solution.

Special Die Sets—When special die sets will have irregular contours, steps, bosses and other built-up sections or machined pockets, a set with these components integrally cast offers extensive savings in machining or fabricating costs.

WHERE BETTER STEEL DIE SETS START



Catalog Sets Begin as mill-cut steel punch holders and die beds, shown above in a partial view of the Producto stockpile. These steel blanks are readily available to replace inventories of completely machined components, permit immediate completion of large orders for any one size. Pre-cutting of catalog components leaves flame-cutting equipment free at all times for work on specials.



Special Sets Begin their journey through the Producto plant at modern flame-cutting machines like the one shown above. Always open for specials only, this machine cuts any shape of plate up to 8" thick. Operator is tracing template, contours of which are reproducing a 3" thick punch holder for a special set. Latest-type equipment manned by skilled operator gives greater accuracy of dimensions for length and width of sets and cut-out or drop-out holes, by permitting straighter, cleaner flame-cut edges.

From stockpile to shipping room, Producto's unmatched modern facilities are keyed to meet your every die set need quickly. For precision die sets fast, call your nearest Producto branch.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Avenue, Bridgeport 1, Connecticut
FOrest 7-8675

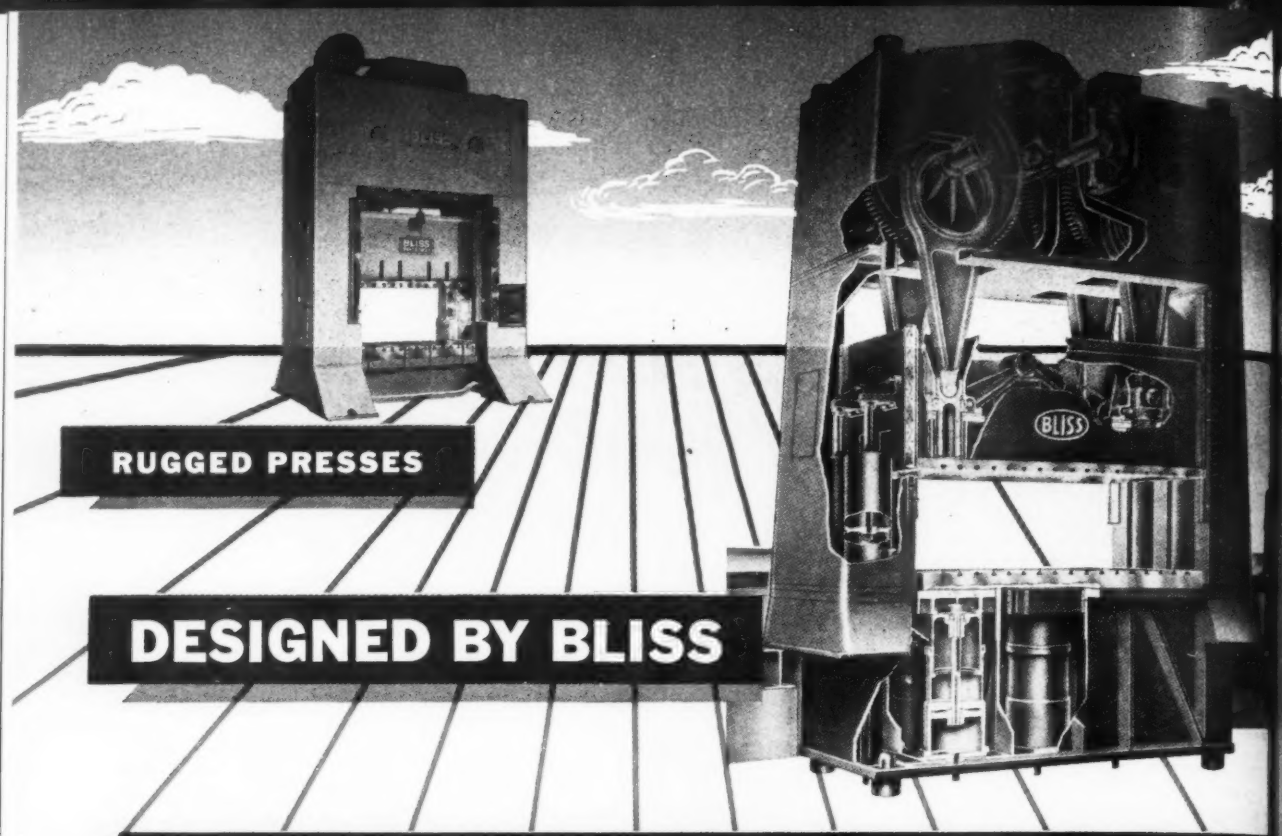
For prompt die set service, 'phone these PRODUCTO assembly warehouses:

Atlanta	CY 7667	Detroit	LI 6-7600	New York	WO 4-7484
Chicago	ES 8-3307	Kansas City	VI 1162	Philadelphia	MO 4-1010
Cleveland	SU 1-6158	Los Angeles	TR 9826	Rochester	GL 1810
Dayton	MU 1651				

or check the Yellow Pages in any stamping center in the United States or Canada for distributors stocking PRODUCTO.

Produce More With PRODUCTO ***Die Sets***

CIRCLE INFORM-A-GRAM KEY NO. 61



RUGGED PRESSES

DESIGNED BY BLISS

FOR THE AGE OF AUTOMATION

Bliss "packaged presses," built to JIC standards, offer advantages like these

- All piping and wiring for press controls, automatic work-handling devices and maintenance tool power outlets are *built into the uprights.*
- Cuts installation time and costs—practically all the installation crew has to do with the press is "plug it in".
- Eliminates split responsibility for press performance—centers it instead on the press builder.
- Simplifies installation and maintenance of dopers, cushions, lifters, Iron Hands and other work-handling devices.
- Leaves clean, uncluttered exterior—cranes can move up close to load or unload dies without bumping or snagging.

FOR MORE INFORMATION, WRITE

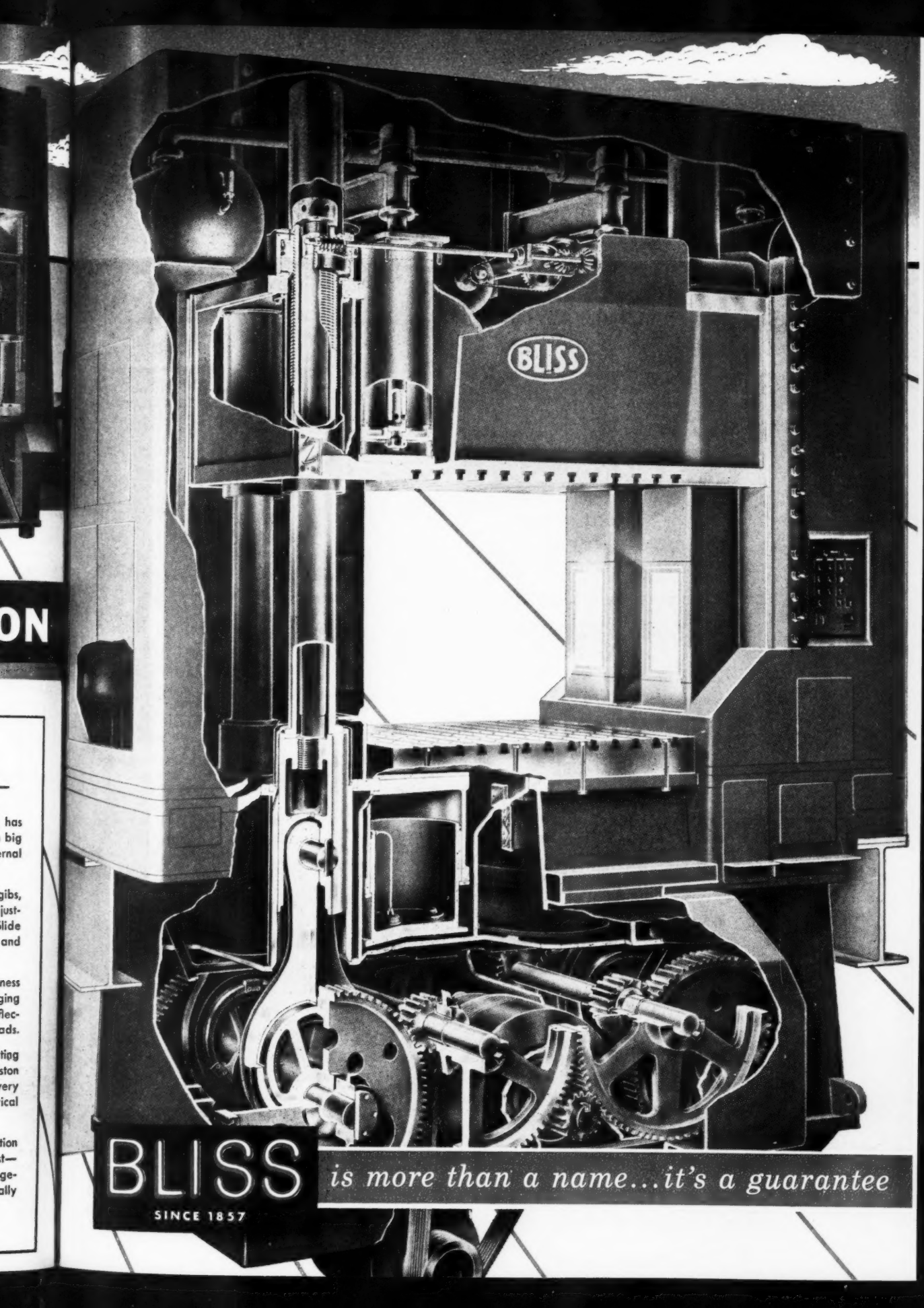
E. W. BLISS COMPANY, Canton, Ohio

Presses, Rolling Mills, Special Machinery

U. S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; San Jose, Calif. Midland and Pittsburh, Pa.

Beneath the sleek exteriors are these new design features—

- Heavy frame construction — For a century, Bliss has been known for its emphasis on heavy frames. With big presses like these, Bliss' heavy sections and internal ribbing easily take quick shock loads in stride.
- Extra-long gibbing—slide works entirely within gibs, even when adjustment is down. Motorized slide adjustment is self-braking, assures accurate positioning. Slide runs true at all times, meaning longer die life and greater accuracy.
- Integral gear and eccentric drive — its compactness allows gears to operate within the crown. No overhanging gear guards. And Bliss' design eliminates torsional deflection of main pin, minimizes distortions due to overloads.
- New automatic lubricating system — a recirculating type which has proved foolproof in service. Positive piston displacement method automatically lubricates every bearing surface at predetermined intervals. Electrical interlocks shut down press if a single feeder fails.
- Cool-running high speed clutch — Bliss' combination pneumatic friction clutch and brake is extremely fast—only a fraction of an inch needed between full engagement and brake. Self-aligning feature automatically compensates for wear. Clutch is also self-cooling.



BLISS

SINCE 1857

is more than a name...it's a guarantee

Zagar Gearless Drill Heads

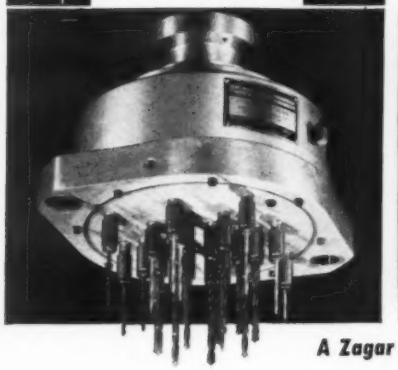
put 4 big advantages to work for you

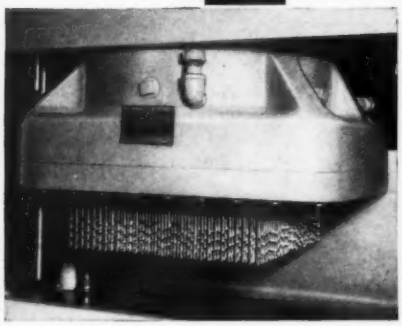
Any number of holes

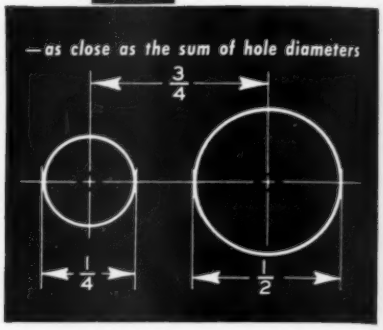
Any hole pattern

Any material

On all centers





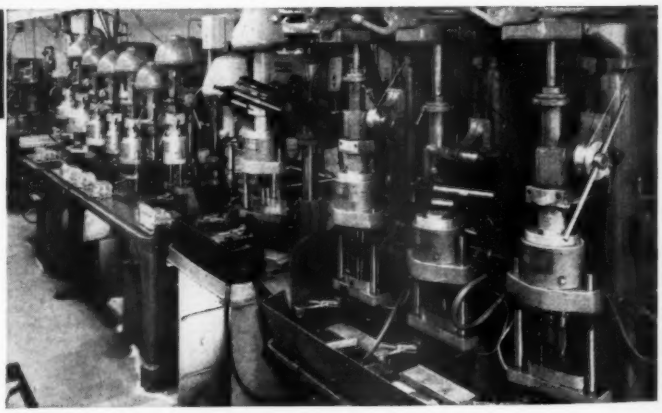


A Zagar drill head is never obsolete. Zagar can re-locate spindles for other hole patterns.

Can you visualize the savings made possible by drilling up to 1000 holes at one pass? Zagar standard practice can handle any machinable material up to 1½" diameter. Holes of varying diameters can be drilled to form any pattern. Zagar Gearless Drill Heads, their efficiency proven by many years' success, can be installed on existing drill presses. Or, Zagar will lay out the necessary tooling for your entire job. May we see your sample parts and study your requirements? There is only one *right* answer—one *best* answer—for those requirements. May we supply it?

Let **ZAGAR** tooling plan the complete job for you

Whether your runs are long or short, let Zagar engineering survey your needs with a view to saving you the cost of special machines. In the case at the right two lines of *standardized* self-clamping drill jigs ream, tap and drill an aluminum die casting, both valve body and cover. The problem of limited production was readily solved. What, sir, are your requirements?



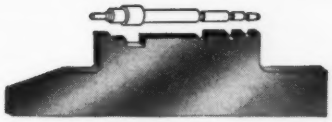
ZAGAR TOOL, INC. 24000 LAKELAND BOULEVARD, CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Write for Technical Data Sheets "T-6" for more information.

CIRCLE INFOM-A-GRAM KEY NO. 64

91 days Continuous Production . . . with Talide®-TIPPED CENTERLESS BLADES



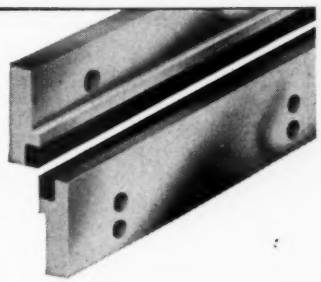
LARGE ELECTRIC MOTOR PLANT

PART.....Stainless Steel Rotor Shaft for Electric Motor.
OPERATION.....Grind 7 diameters simultaneously.
MACHINE.....No. 2 Cincinnati Centerless Grinder.
BLADE.....Special multiple step Talide-tipped work support blade No. C-4884.
RESULTS.....Talide-tipped blade in continuous production for 91 days (2 turns per day) compared to best previous production run of 3 days with hard alloy steel blade.

Talide-tipped centerless grinder blades are stocked in over 50 styles and sizes for all types of infeed and thru-feed operations. Special blades for form work including tapered pins and arbors, shafts having multiple diameters, and parts with special contours can be supplied to order. Send print or sketch for quotation.

800,000 CUTS WITH TALIDE SHEAR BLADE!

A leading electrical manufacturer shearing .014" silicon steel for transformers has completely equipped their press line with Talide-tipped blades in lengths ranging from 17" to 64". Blade life is averaging 800,000 cuts per grind compared to 10,000 cuts obtained with steel blades, and customer estimates annual savings of $18,000.



One-piece Talide strip (up to 100" without seams) prevents scoring and scratching. Write for new 84-page Catalog 55-G or ask for sales engineer to call. Metal Carbides Corporation, Youngstown 7, O.

LARGE SAFETY RAZOR COMPANY NETS $20,000 SAVING!

After unsuccessfully experimenting with several other brands of carbide knives, the world's largest razor blade company tested and accepted Talide rotary knives as being far superior to any knife for the gang slitting of razor blade strip steel.

Phenomenal runs of 90 to 1 over hi-carbon, hi-chrome knives and the smoother, burr-free cuts obtained have reduced customer's slitting expense by more than $20,000. Over 1200 coils were gang slitted with Talide knives compared to an average of 15 coils with steel knives. More tonnage was produced in 1 regrind of the Talide knives than over the entire life of a set of steel knives.

Outstanding production runs like this are possible because of the extra dense and porous-free structure of Talide metal. Try Talide blades and knives on your next shearing or slitting job. They're hard to beat and harder to wear out!

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 7, OHIO

HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 65

Editorial Index

DEPARTMENTS

SHOP AIDS 115
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PUBLICATION PREVIEWS 134
Capsule description of current literature. Bulletins, brochures, catalogues and circulars — You name it.

PROGRESS ON PARADE 152
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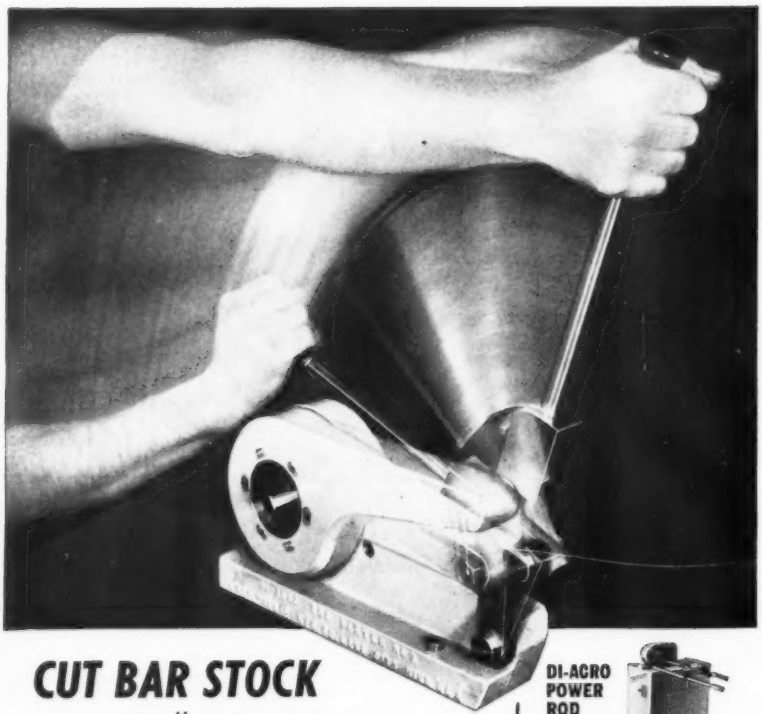

CUT BAR STOCK up to 5/8" Diameter

ACCURATELY, INSTANTLY WITH DI-ACRO* ROD PARTER

The shearing-breaking action of a Di-Acro Rod Parter allows most bar stock to be cut without burr and distortion. Cutting heads accommodate eleven different round stock sizes. Also special heads for cutting square, and other shaped bars.

LIKE MORE INFORMATION? Send for 32-Page Catalog
Gives complete details on hand and power operated Di-Acro Rod Parters, Benders, Brakes, Notchers, Press Brakes, Punch Presses, Rollers, Shears, and Spring Winders.

DI-ACRO POWER ROD PARTER

Instantaneous cutting action. Motor driven flywheel and other moving parts are housed in welded steel cabinet.

*pronounced Die-ack-ro

di-acro PRECISION METALWORKING MACHINES

Creators of "Die-less Duplicating"

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CIRCLE INFORM-A-GRAM KEY NO. 66

EDITORIAL — The Country's Prospects 69

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Editorial Index

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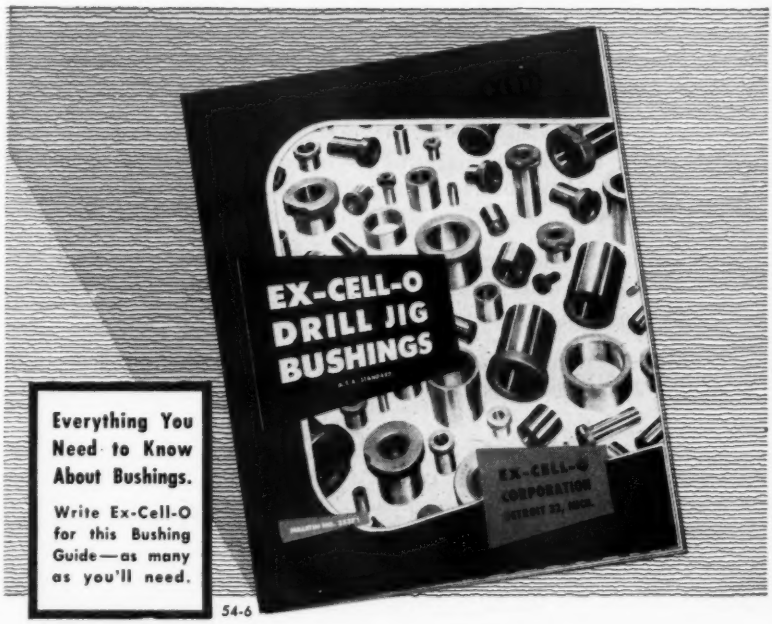
— SHORTS —

New Combination Clutch & Brake for Punch Presses 94
Oxygen Contour Cutting Machine 102
Automatic Protective Packaging..106
Stereomicroscopes Bring 3-D to the Assembly Line 106
F. Leroy Hill Elected Camdale Board Chairman 110
Recessing, Boring Cuts Combined with New Tool 110
Dents Pulled Out with Vacuum..112
World's Largest Extrusion Press..112
Speed Selector Featured in New Lathe 120
Indicator Gage Checks Surface Flushness 121
Micro-Positioning for Automatic Machine Tools 130
New Techniques Used in Filming New Process 131
New Screw Machine Embodies Many Needed Features 132
Diamond Group Elects Officers...133
Smaller Hydroform Offers Savings 143
Ultrasonic Check on Pipe Walls..143
Spline Honing Machine 144
Nickel-Plate CF&I Steel Plate....145
Transfer Machine for 450 PCS/HR 145
Flattening Weld Area with Planishing Roll 146
Carbide Tooling Solves Eccentric Turning Job 147

DEPARTMENTS

WILL YOU BE THERE? 53
MANUFACTURING MEMOS 99
COMMENDABLE COMMENTS 100
GROWING PAINS 111
CALLING CARDS 113
MEN YOU SHOULD KNOW 116



Everything You Need to Know About Bushings.

Write Ex-Cell-O for this Bushing Guide—as many as you'll need.

54-6

A Complete Bushing Guide
for your Engineering and Purchasing Files

This catalog pictures and describes A.S.A. standard bushings. Gives helpful suggestions to purchasers and designers, lists hundreds of Ex-Cell-O bushings available from stock. MAKES ORDERING QUICK AND EASY.

IMMEDIATE SHIPMENT from Detroit, New York, Los Angeles and London, Canada. See local addresses at right.

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CIRCLE INFORM-A-GRAM KEY NO. 67

Editorial Index

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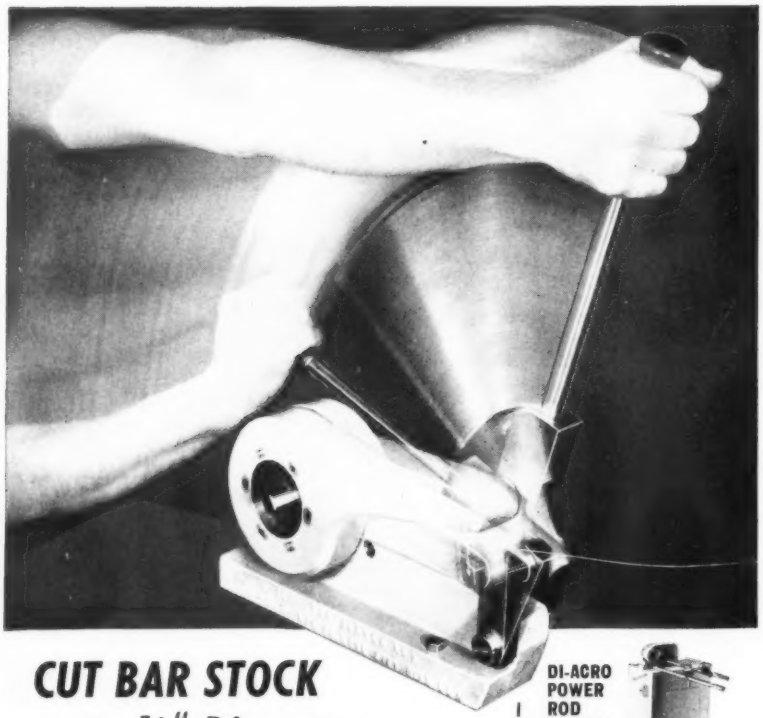

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Micro-Positioning for Automatic Machine Tools 130
New Techniques Used in Filming New Process 131
New Screw Machine Embodies Many Needed Features 132
Diamond Group Elects Officers...133
Smaller Hydroform Offers Savings 143
Ultrasonic Check on Pipe Walls..143
Spline Honing Machine 144
Nickel-Plate CF&I Steel Plate....145
Transfer Machine for 450 PCS/HR 145
Flattening Weld Area with Planishing Roll 146
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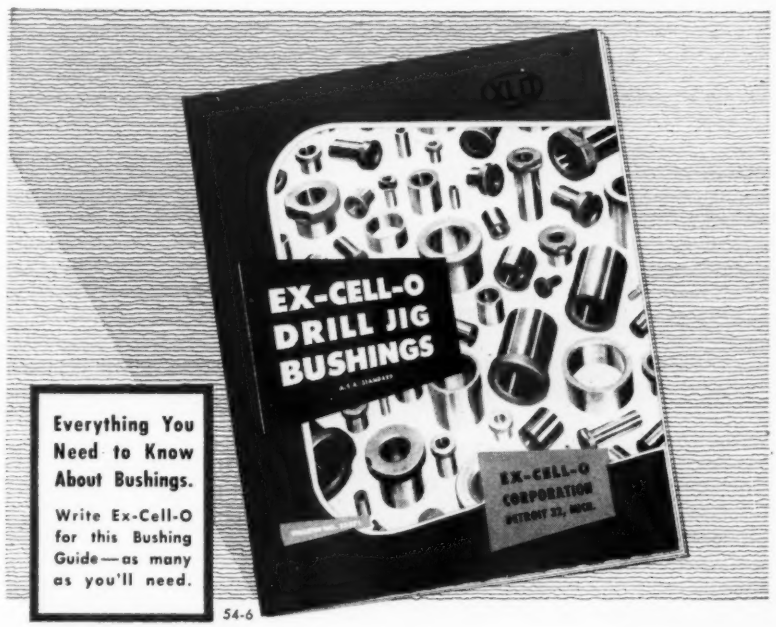
DEPARTMENTS

WILL YOU BE THERE? 53
MANUFACTURING MEMOS 99
COMMENDABLE COMMENTS 100
GROWING PAINS 111
CALLING CARDS 113
MEN YOU SHOULD KNOW 116



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Which will it be—?

Price

Cost

As you well know, *price* of new equipment is only the beginning. Actual production savings determine real equipment *cost.*

From this realistic *cost* standpoint you can't beat Erickson collet chucks. Here's why:

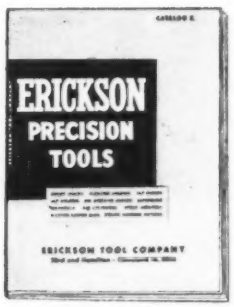
Guaranteed accuracy of .0005" and superior gripping power of Erickson collet chucks assure proper drill alignment. Drills then cut evenly on both cutting lips permitting faster machine feeds and proper speeds . . . give more holes per grind.

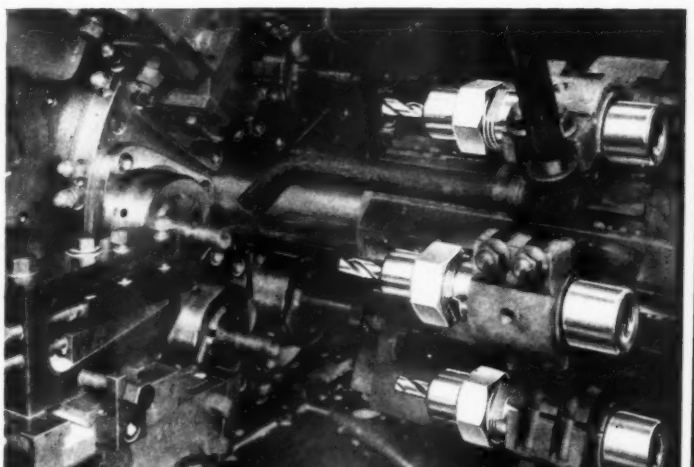
What's more, ease of operation greatly reduces set-up time and since Erickson chucks can grip on the flutes, you can stub your drills . . . extend tool life . . . maintain accuracy.

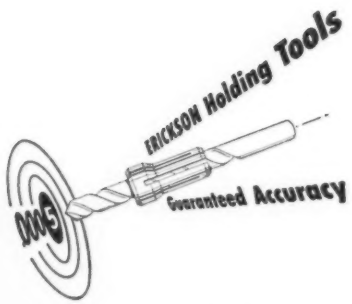
Send for new Catalog K today! It gives the complete Erickson story. You'll find many interesting applications for all Erickson holding tools.

A-9592

ERICKSON TOOL COMPANY 2301-6 Hamilton Ave., Cleveland 14, Ohio







COLLET CHUCKS • FLOATING HOLDERS
TAP CHUCKS • TAP HOLDERS • AIR-OPERATED
CHUCKS • EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 68

the country's prospects for 1960 are good- - how about yours?

There are two tremendously important aspects to the survey and projection of this country's economy, just released by the research staff of the Twentieth Century Fund, headed by Economist J. Frederick Dewhurst.

First, is the projection itself. Based on a continuing U. S. peace and prosperity, their prediction is that 1960's Gross National Product (G. N. P.) will be 413.5 billion dollars. This is up 29% from 1950, and up 16% from 1954.

Second, is its possible accuracy. Dewhurst's first Twentieth Century Fund survey, made during the 1940s, forecasting the G. N. P. for 1950, missed by only 7%; and that was on the conservative side.

It all adds up to a pretty constructive and encouraging picture. The survey, however, is based on statistics and the projections are statistical, although finally expressed in terms of dollars. The survey offers information which you can use in deriving an answer to that all-important question: what is the picture for your specific business come 1960? Are you going to try to let statistics and the law of averages "take care" of your place in the picture? Are you going into "free-wheeling" and assume that if 1960's G. N. P. will be up 16% all you have to do is to wait until 1960 in order to find your business up 16%?

Do you think your competitors are going to string along with that form of "security" for your business? Not if they can help it!

Our economy is dynamic, there is nothing static about it. In a free-enterprise, competitive economy, there is no standing still. If your volume remains constant and your competition gains, you haven't stood still — you have fallen behind. This applies whether you manufacture circuit breakers or bird cages.

Your today's selling price is based on yesterday's costs. With costs for direct labor and materials rising, how can you maintain today's selling price and come up with the profit necessary for survival tomorrow?

If you raise your selling price in order to sustain profit — your competitors will thank you, and you will sell less! Such an action is hardly in keeping with 1960's outlook, and will hardly cut you in on 1960's predicted 16% increase over 1954.

It costs a given amount to turn out one dollar in product at so much profit per dollar. So, in the competitive market you can't even take recourse to the idea of both raising your selling price and offering a better product. That approach will not prevent the increasing cost slice of the dollar pie from enlarging to the extent that there is no profit slice. Admittedly, your customers would be willing and ready to pay more for a better product, but if in the process your profit slice vanishes, how long will you be around to receive their payments?

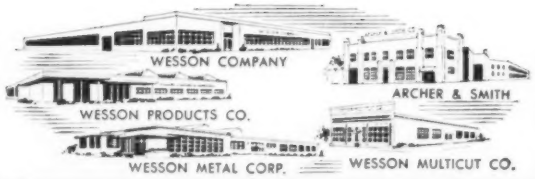
Obviously, your only answer is to keep the cost slice of the product dollar from getting any larger. Most commonly, this is spoken of as decreasing the costs. And it is the implication that this must be accomplished by laying-off or doing away with direct labor that has caused the unions to agitate for the guaranteed annual wage.

They are unwilling to see that if the present direct labor force, while enjoying increasing hourly rates, is given newer and more productive tools to work with (on increasingly costly materials), only thereby can the direct labor force insure that its cost slice of the product will not grow to the extinction of the profit slice.

The only way, therefore, that you can retain a profit slice out of your product dollar, is to keep the cost slice from getting any bigger. This means new, modern and more efficient machine tools, tooling, methods and processes, with which your employees can guarantee their own jobs by enabling you, come 1960, to still be their employer. It's just that simple.

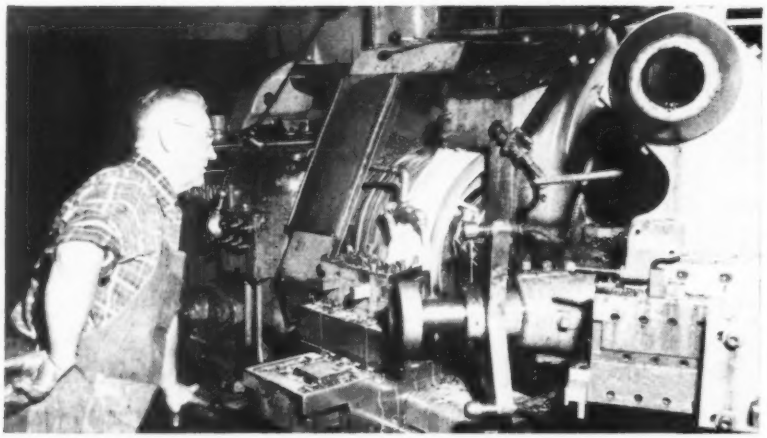
E. Willard Pennington

editor

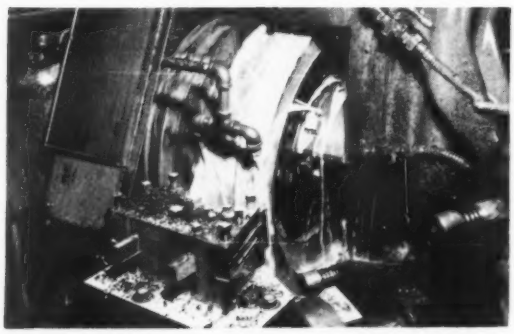


carbide NEWS

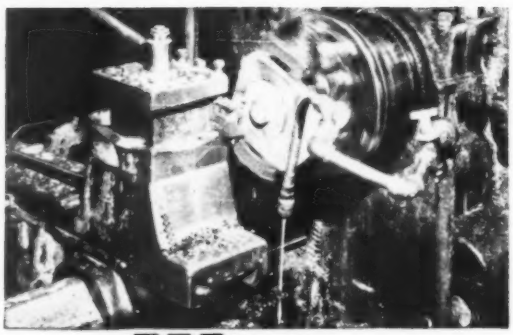
New Grade 26 Nearly Universal



Straddle facing the O. D. of a forged steel final drive gear on a 4F Gisholt Fastermatic lathe using Wessonmetal Grade 26. Tool life increased 40% over other carbides.



Closeup of straddle facing operation. Two solid carbide Grade 26 inserts are used. Job is being done at 260 sfm and 40 rpm. Feed varies from .017" to .020" with average depth of cut from 3/16" to ¼".



Grade 26 produced a 30% increase in tool life on a severe interrupted cut on a tractor brake band anchor. Standard Wesson band-type Multicut is used on a Warner & Swasey turret lathe. Cutting speed ranges from 280 sfm down to zero. Feed is .027", depth of cut is ⅛".

Useable on 95% of steel cutting operations, it boosts tool life 40%

The nearest approach to a universal cutting grade available to the metalworking industry is a new carbide designated as "Grade 26" by Wesson Metal Corporation. Created primarily for all types of steel rough and semi-finish machining, it is also proving highly effective on some finishing operations.

Problems of carbide selection are greatly simplified by Wessonmetal Grade 26, since it cuts down the number of grades required for steel cutting operations by as many as four grades.

Optimum performance for Grade 26 extends over a range of 100 to about 400 sfm, covering 95% of steel machining operations encountered in industry today.

Much of Grade 26's record of outperforming all other steel cutting grades in 95% of all machining operations on which it has been applied is due to its superior edge cutting strength. Grade 26 was developed to have high red hardness and high thermal conductivity in order to function without any drop in performance at the elevated temperatures generated at high cutting speeds.

Improvement in tool life over all other grades has averaged about 40% on applications to date. Extensive tests have been conducted on a wide range of materials ranging from conventional steels to the high alloys used in high temperature applications.

Now in full production at Wesson Metal Corporation's new metals plants in Lexington, Ky., Grade 26 provides the answer to lower tool costs over a broad range of metal cutting operations.

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TOOLING and PRODUCTION
the Magazine of Manufacturing Management

The editor reports on – – –

CYPAK SYSTEMS

a new concept in the electrical control of machines and processes

THOSE OF US who attended the 19th Annual Machine Tool Electrification Forum, sponsored by the Westinghouse Electric Corporation, were treated to the disclosure of a radically new approach to the control of machining processes. The new technique promises to increase the versatility, dependability and life of those electrical elements essential to making machines and processes automatic.

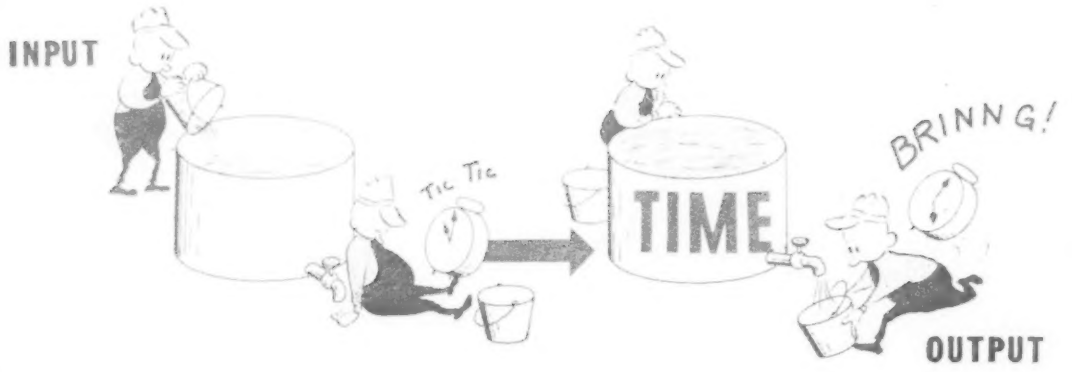
The initial announcement, made by K. M. Patterson, Manager of Industrial Sales for Westinghouse, shows in relatively few words the thinking that sparked the new development. Mr. Patterson said:

"Westinghouse is privileged today to be able to announce to the Machine Tool Industry what we advisedly consider to be the most important development in machine tool control in recent years. We, along with industry in general, have watched with concern the growing complexity of control systems — particularly large machine tool control. We have felt that we were approaching the limits of machine tool control, both in size and complexity. Both builders and users have repeatedly echoed this opinion.

"By far the majority of machine tool controls are sequencing controls, which means, of course, a great many relays. Because of the nature of machining processes, machine tool control designers have concentrated heavily on sequencing systems, and have accomplished some remarkable things with it. The high production industries — automotive, farm equipment, appliance manufacturers, and others have been able to build their manufacturing processes around the automatic and semi-automatic machine tools controlled by sequencing systems. And paralleling the increase in control complexity has been cost of machine down time due to maintenance. Users have had to demand more reliability.

"This reliability problem has not been connected with control system design but rather with components. Up to the present time, it has been impossible for the electrical manufacturing industry to build a relay with the

Here is an accounting of the research and development steps which have culminated in low voltage relay systems, limit switches and push button controls which eliminate sparking contacts – fire hazards – corrosion and erosion – springs – and wear problems. E.W.P.



reliability desired for control of high production machines. We believe that we now have the answer.

"The results of a long-term research and development program in the study of solid-state phenomena make it possible to introduce to you today Westinghouse Cypak systems — static switching circuits for industrial control. They are essentially relay systems which have no moving parts.

"Cypak systems will be able to perform any function now performed by relay systems in machine tool control. And they will do it without benefit of contacts or other parts that would be subject to wear, erosion, or environmental conditions. We earnestly feel that Cypak systems are not only the answer to today's machine tool control reliability problems but they also represent the means for obtaining future machine tool control many times more complex than is possible with present-day control."

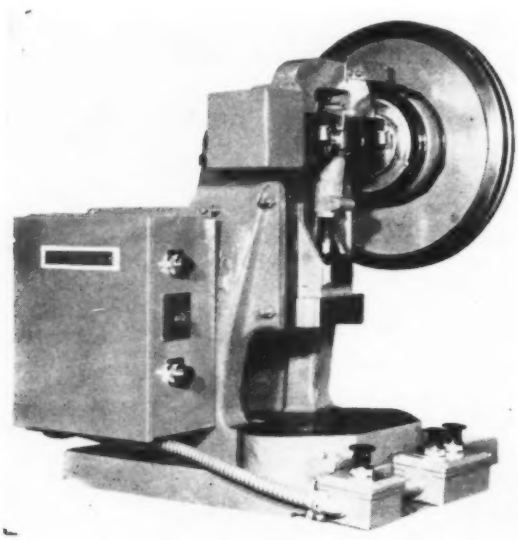
An explanation of Mr. Patterson's reference to "solid-state phenomena" will enable one to comprehend the transition from such electro-mechanical devices as switches relays, with their springs, bearings, and moving contacts, to electro-magnetic devices containing no moving parts.

Units of electricity and magnetism do not wear out, do not corrode, do not bend or break. But they can be put to work tirelessly and infinitely repetitively. For every electric or magnetic action there is a reaction, and this reaction can be put to work as an obedient servant of the initiating action. The reaction can be greatly empowered or magnified by amplification, which means that the initiating actions can be of very low current and voltage values. Work-a-day examples of solid-state phenomena are resistors, capacitors, transistors and magnetic amplifiers.

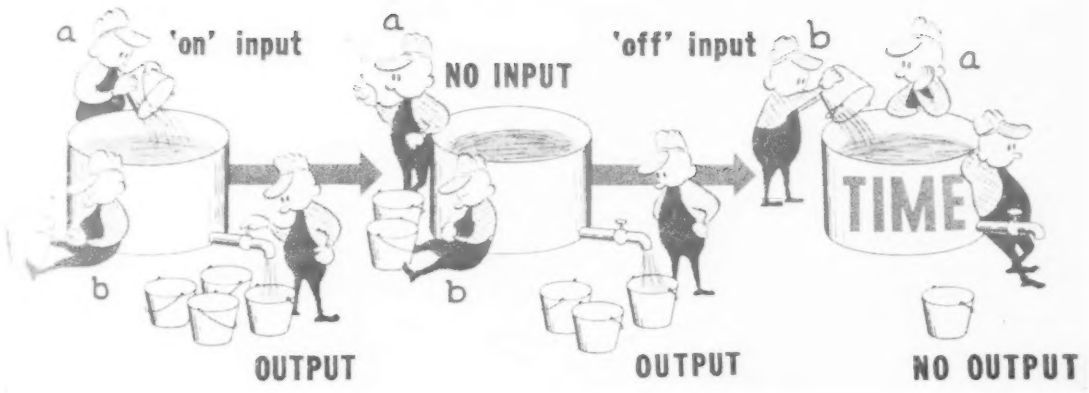
The two outstanding characteristics, then, of Cypak systems are (1) they have no moving parts, and (2) they can be triggered by relatively low values of electrical measure. This means, in a complex automated production machine, that the complicated control circuits can be operated on much smaller voltage and current values than heretofore.

Much highly enlightening information on the developmental approach to Cypak systems was presented by R. A. Ramey who heads up the Westinghouse magnetic development activities. He told us that:

"Cypak systems are . . . not direct replacement for relays on a one-for-one basis; they are intended as replacements for relay systems. When present-day industrial relaying systems were analyzed functionally, it was found that the major use of relaying was for information processing rather than power switching. It was found that the problem of



This small press is equipped with the new Cypak system for anti-repeat, air-clutch control. Conventionally, this would be accomplished with relays, push buttons, and limit switches. Vibration from the press and abusive atmospheres have virtually no effect on the Cypak components.



information processing could be considered as separate from that of power handling. The engineering problems in developing Cypak systems then fell within logic science rather than the relay art. Actually, their specific development is analogous to the general development of industrial control.

"The industrial-control designer uses two basic types of information to control machines and processes: a continuous signal of variable quantity or analog information; or a discontinuous signal in discrete amount or digital information. The entire science of industrial control has been built around these two fundamental concepts. Consequently industrial control components, as well as systems, fall into one of these two categories. For example, the tachometer generator is an analog device; a relay is a digital device.

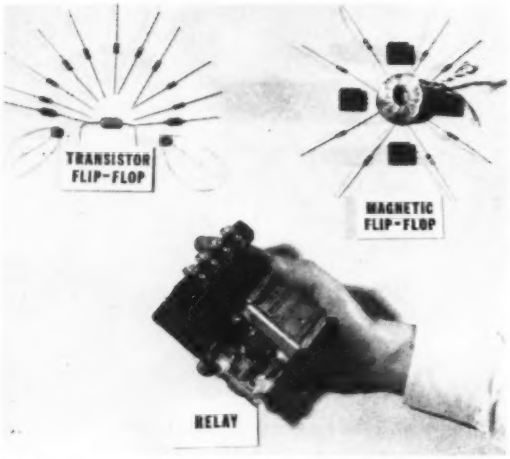
"The application to be controlled usually determines the type of control system used. On a variable-speed planer, for example, the speed of the table during cutting is usually controlled through analog means. At the end of the cut, however, a limit switch is used to send a signal to the control, indicating the end of the cycle, and initiating high-speed return of the table. This control is digital in nature.

"The switch — electric, electronic, hydraulic, or mechanical — is the heart of a digital system. In terms of system operation, the switch is simply turned on and off in accordance with the control requirements. And although many electrical switches, especially relays, have been built to operate literally millions of times, users have long asked for a switch with still longer life — one that would virtually never wear out. Cypak systems may be the answer . . .

"They are, in a general sense, switching systems. Hence, they are essentially digital in nature, but can be easily combined with analog devices where the control problem warrants it. In the development of Cypak systems, principal design emphasis has been placed on extreme reliability, flexibility, ultimate utility, and low cost. These design objectives have been met . . .

"Cypak systems are composed of a small number of basic elements, none of which has moving parts, combined to perform specific functions. The functions performed are familiar to engineers working in computer technology or with relay and switching circuits. These functions may be thought of as building blocks that can be combined in a variety of ways to establish a desired relationship between the information that is fed into the control system, and that which is taken out . . .

Close-up of the Cypak elements constituting the press control. This control does everything the old relay system could do, and in addition has much longer life, higher reliability and more rugged construction. Its fail-safe features fulfill the foremost requirement for any press control — operator safety.



A visual comparison of the "solid-state", non-moving components of transistor and magnetic flip-flop elements compared to a relay.

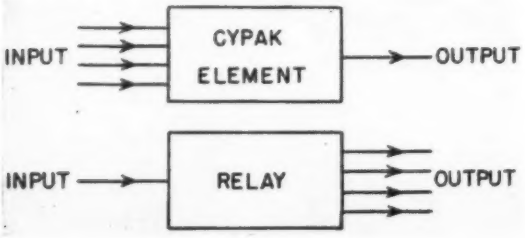
"There are a great number of component combinations that will perform these functions — relays, electronic tubes, and many others. However, the field is narrowed by the establishment of several design objectives.

"The first objective established in the design of Cypak systems was the elimination of all moving mechanical parts to assure longer life, higher reliability, and a high degree of freedom from environmental influence; second, was availability and reasonable ease of manufacture; and third was cost. The end product had to be produced at a cost equal to or less than existing systems. These objectives have prompted the use of semi-conductor and magnetic-core devices for components of Cypak systems . . .

"The principal method employed to maintain comparable cost was the use of very low power levels in the decision-making or logic components of the Cypak system. It is the current thinking that these power levels should be as low as 10 milliwatts or even less.

"Amplification from the logic to the power level is preferably accomplished by magnetic amplifiers. However, transistor amplifiers may be used, and there may be some cases where, due to the large amount of power to be handled, a standard electromechanical contactor would be desirable. This use of low power level inputs also makes it possible to utilize unique push buttons and limit switches that have no moving functional parts or contacts. Photo transistors, for example, can be easily integrated into a Cypak system without intermediate amplification . . .

The Cypak element may have several inputs but can have only one output. With the relay, the opposite is true.



"With the high reliability and performance of the new systems, one can visualize future trends that will result in integrated process and machine operations vastly more complex and extensive than anything now known to industry."

Various applications of Cypak systems to industrial control were cited by D. L. Pierce, Manager Control Engineering, Westinghouse Motor and Control Division. He brought up the subject of low voltage controls when he said:

"In considering over-all reliability of the control system, we must also consider the accessories, such as push buttons and limit switches. Immediately this question arises: What voltage should they operate at?

"Past history on industrial control clearly indicates that with present control components the minimum satisfactory voltage is 110 volts. Anything less subjects the control to too much trouble from contacts not making circuit due to small particles of dirt and contact corrosion. The spark-over ability of 110 volts is sufficient to minimize this.

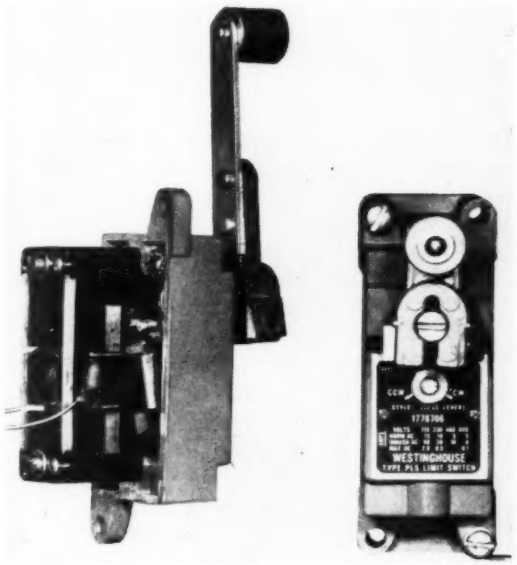
"There are many advantages to using voltages less than 110 volts on the control system; however, size, cost, and failure hazard under adverse conditions are a few. There is also a need to improve the reliability of push buttons and limit switches and the first step would be the elimination of contacts.

"Since contacts have been the limiting factor in going below 110 volts, and since contacts need to be eliminated to obtain long trouble-free life, it is our conclusion that the maximum benefit can be obtained by the use of contactless push buttons and limit switches.

"We propose to build contactless push buttons and limit switches using a magnetic operating unit that will operate on an 18 volt circuit.

"We have chosen the magnetic element primarily due to its present state of reliability and known performance. We have used magnetic amplifiers by the hundreds as Class A amplifiers in feedback control circuits for several years. They have been applied on all kinds of applications. To function properly without adjustment they must maintain absolute stability of characteristics . . .

"Several months ago, a Cypak system was applied to an automatic bus duct welder. Since that time, over a quarter-of-a-million operations have been made with this control. It is interesting to compare the old relay control with the Cypak system. Although this is not a complex sequencing control, it still embodies all the fundamental problems found in the most complex controls. For comparison purposes, the old relay panel and the Cypak system have both been mounted on the machine with provisions for switching from one system to the other.

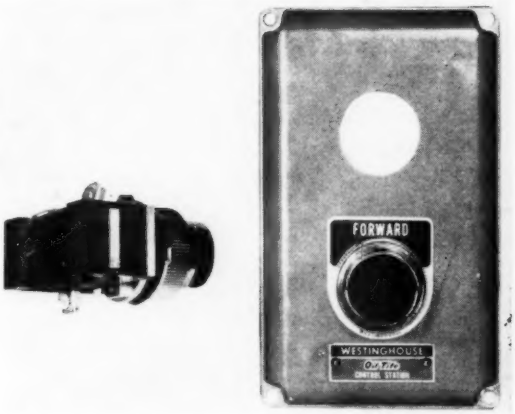


This magnetic limit switch is a reactor-type device. Movement of the actuating lever shifts the pattern of magnetic flux and changes the inductance of the reactor sufficiently to effect an ON and OFF control of the 18 volt Cypak systems.

"In addition to the welder application, Cypak systems have been built up and tested for such controls as a fully automatic six story elevator; a complicated spiral milling machine control; a skip-hoist director which permits the automatic charging of a blast furnace in accordance with a pre-selected program; a punch-press control; and many others. Cypak systems have definitely shown their merit so far as industrial control applications are concerned."

W. H. Brandt, Manager, Engineering, for the Westinghouse Director Systems Department gave us detailed descriptions of the Cypak system components and circuitry. After pointing out the electrical characteristics which make relays suitable for complex control systems, he said:

"The relay's great weakness — it can never have the required degree of reliability — is a natural consequence of its construction. It

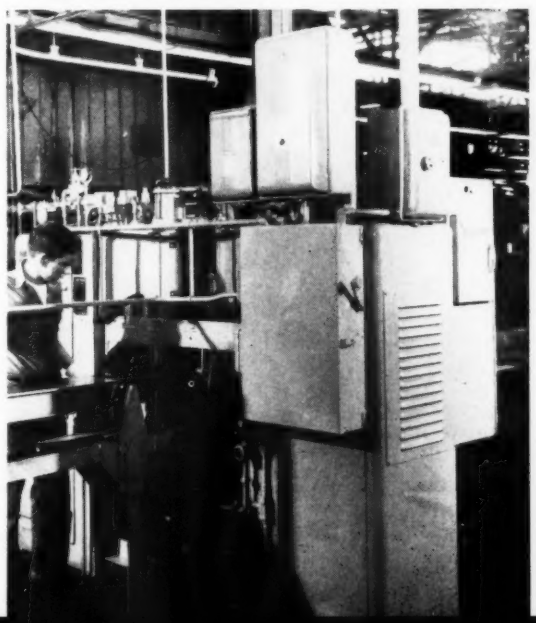


The magnetic push button switch has no make and break contacts to erode, spark over, or wear out. One switch has controlled simultaneously 17 flip-flop circuits, 22 AND-OR circuits and 4 NOT circuits of a Cypak system without being loaded to full capacity.

has moving parts which are subject to wear. It has contacts which change with time, erode, and are strongly subject to environmental conditions. The new device to replace the relay must then have no moving parts and no contacts but yet must be a step function device whose output is higher than its input. To make the device commercially feasible, the restriction of economic manufacture must be imposed. That is, the device must be so designed that it can be easily duplicated millions of times with nearly identical results.

"To fulfill all these requirements, we are led quite directly to solid-state phenomena. Two such phenomena are known that will fulfill these imposed requirements — magnetism and semiconductivity. The phenomenon of

Since a Cypak system was applied to this automatic bus duct welder, over a quarter-million operations have been made under the new method of control.



ferro-magnetism has been used by man for centuries. And man has known how to control certain ferro-magnetic properties for about 65 years. Semiconductivity has been used for a little over a quarter of a century and properties have been intensively controlled for about half that time. In magnetics, the main developments have been made through trial and error and thus have come gradually . . .

"There is another difference between relays and static devices that causes some difference in circuitry. A relay will handle either alternating or direct current in either input or output. To make static devices equally flexible, another component is needed — a rectifier. Fortunately it is again provided by semiconductor technology. Two types of static rectifiers are available for use in Cypak system components. The first is the selenium diode; the second is the silicon diode. These diodes are the basis of logic in Cypak systems. By using rectifiers in combination with magnetic elements or transistors it is possible to duplicate all functions performed by relays. However, this makes the circuitry look quite different in the case of magnetic elements and it also makes the transistor circuitry quite different from that of either magnetic elements or relays.

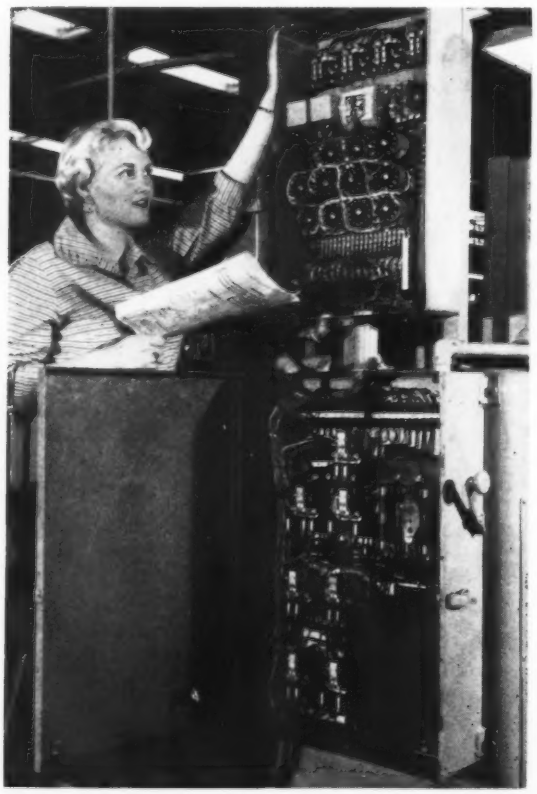
"Detailed circuitry of these various elements is involved. However, it is possible to get a good visual comparison between the three systems, from the accompanying illustration. A high-quality relay is shown in the center; the components of a magnetic flip-flop element are shown on the right; and the components of the transistor flip-flop are shown on the left. The flip-flop elements perform the unlimited TIME functions . . .

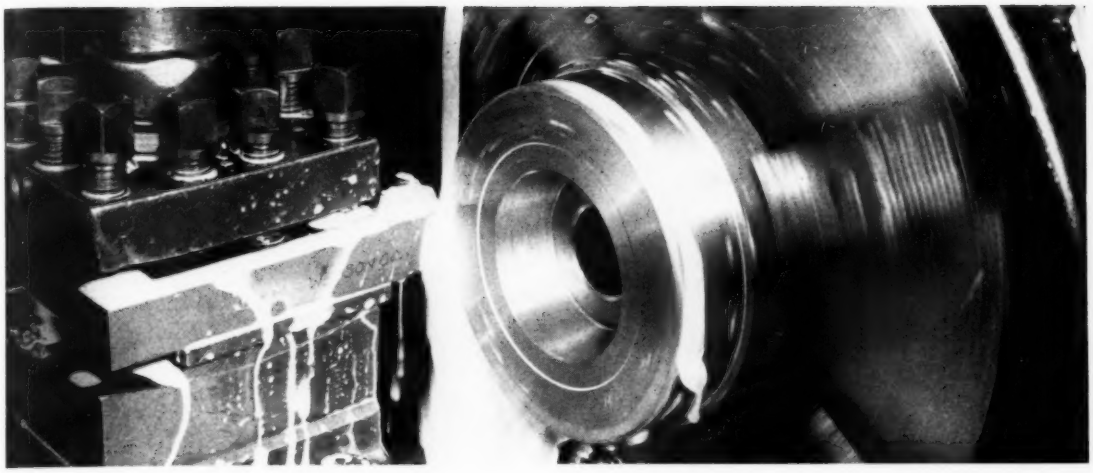
"There is another advantage of static elements over relays that has barely been touched upon. The transistor and magnetic elements have been designed to operate at very low power levels. In general, this saves weight, space, and complexity. All of these systems — magnetic, transistor, or relay — require input sensing devices of some sort. Many of these input devices are good, reliable units but have the disadvantage of not having an output power level high enough so that they can feed directly into relays systems. They hence require intermediate amplifiers. Two familiar examples are the photo-cell and thermocouple. Output from these units may be fed directly into Cypak systems without intermediate amplification. It is also true that present day input devices, such as limit switches, are often the first part of the system to wear out. With Cypak systems, input devices of much better reliability can be used.

"What about outputs from Cypak systems? Since the power levels are low, an output amplifier of some sort is usually required. In principle, this output amplifier can be made up of either transistor elements, or magnetic elements, or relays. However, magnetic elements are generally used only where the reliability factor is of prime importance. Transistors, on the other hand, are not yet available in power ratings sufficient for this purpose. There seems little doubt, however, that they will be available in a year or two. Until that happens, it can be expected that relays or breakers will often appear as final amplifiers in the output stage of Cypak systems where output amplifiers generally operate infrequently compared to the other components of the system and the reliability penalty is therefore not great.

"This completes the comparison of the three systems. It is evident that the design objectives in the effort to obtain a device better than the relay have been met. Cypak systems are definitely better than relays, particularly in reliability."

For comparison purposes, the old relay panel (below) and the Cypak system (above) were both mounted on the automatic bus duct welder with provisions for switching from one system to the other.





New Trend in Carbide Tooling

by A. S. Rogers
Field Engineer
WESSON COMPANY
Detroit, Michigan

TO SPOT A TREND in metalworking when it is still in the formulative stages is ordinarily considered pure crystal balling; however, concrete indications point to one important trend now gaining momentum. This is rapidly shaping up around several recent carbide cutting tool developments and constitutes a general Industry turn to the "throw away" carbide tip principle.

Because the "throw away" concept is relatively new to metalworking, a number of questions are being raised, all of which reflect a considerable interest in this new tooling.

"What influenced the new development?" and "What influence will the new 'throw away' idea exert on other carbide tool types?" are the questions most commonly being asked. In areas where single point tools built around this concept have not yet been applied extensively and in areas where they have not even been demonstrated, further evidence of real savings with the new designs is being asked for.

Actually, the answer to these questions and many others can be partially found in a careful analysis of the features, advantages, and limitations of the new tools.

From a cost-reduction standpoint, the new holders are still a long way from a cure-all. However, they do represent an important advancement.

When a plant, through lack of either proper equipment, highly skilled tool maintenance men, or some other factor, does not have 100% efficiency in its tool maintenance, tool change, setup, grinding, inventory, etc., then the new holder and insert designs offer a definite means of cost reduction.

On the other hand, where maintenance efficiency is good, the "throw away" tool types will only provide engineering and application advantages which far exceed the advantages of present tooling in many cases. However, the new concept can be said to offer something to everyone with turning operations in their plant.

An important feature of the new holders is the range of clearance angles possible, as compared to the limitations of other mechanically-held carbide insert holders designed for long inserts.

A top clamp on the Wesson Multicut holder locks the insert against the anvil-locator plate, and also serves as a chip breaker. This clamp seats on serrations which provide easy and positive adjustment.

Of course, the primary feature of the holder design and insert is the disposable insert itself. The insert has up to eight cutting edges and is thrown away after all cutting edges have become dull, thus eliminating all carbide grinding for the user.

Costs Influence Design

Several important needs of Industry, concerning both the major manufacturer equipped with automated processes and the small general metalworking plant and job shop, led to development of the new tool concept.

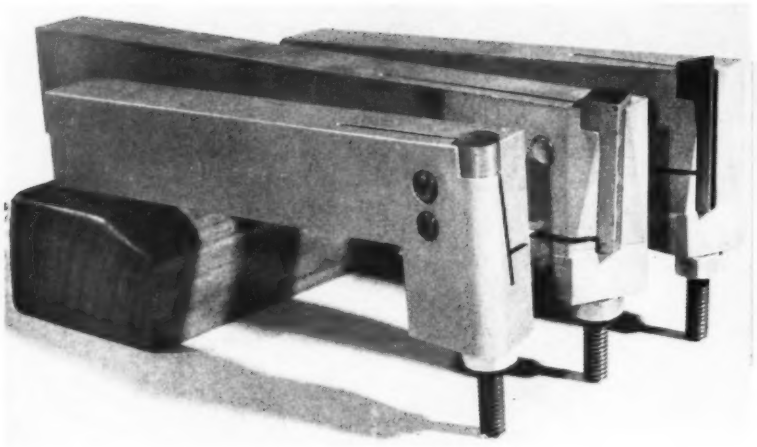


Fig. 1. The split-type solid carbide holders illustrated were among the first widely used mechanically held insert holders in the industry. They constituted an important step toward the present-day, low maintenance cost designs in carbide tooling.

Many of the problems that led to creation of the early mechanically-held carbide insert holders such as Wesson's split-type, plate-type and band-type Multicuts also led to development of the new "throw away" design.

The discovery that negative rake angles could be effectively employed on turning operations made possible the practical application of the "replaceable" cutting edge idea. The evolution of single point tools utilizing the "replaceable" and the "indexable" insert ideas eventually led to the band-type Multicut holders, providing a progressively better answer to the high cost of throwing away the entire tool after a maximum number of regrinds.

These insert type tools offered drastically reduced setup time, faster tool change, greater strength, and rigidity. While flexible, they were more limited in their application than brazed type flat tools, especially on internal operations and operations in closely confined spaces. But, insert holders, especially of the band type, brought replaceable carbide insert economy to thousands of operations.

As the automatic manufacture of products progressed and automation accelerated and became widely used in the metalworking industry, manufacturers utilizing such processes experienced and are today experiencing skyrocketing indirect costs. In many cases, these are almost proportionate to the big reductions in direct costs.

It is considered a fairly accurate estimate that downtime for tool changes accounts for approximately 75% of today's total production downtime for all reasons. Also, a major portion of high tool maintenance costs is reflected in the high cost of grinding.

In the light of these problems, conception of the "throw away" or "no maintenance" idea in tooling was inevitable.

The new holder designs offer the fastest and simplest design for tool change yet conceived. As for **maintenance** grinding, the "throw away" insert eliminates and completely writes off this factor. However, the total reduction or even elimination of grinding is partly attributed also to the adjustable chip-breaker

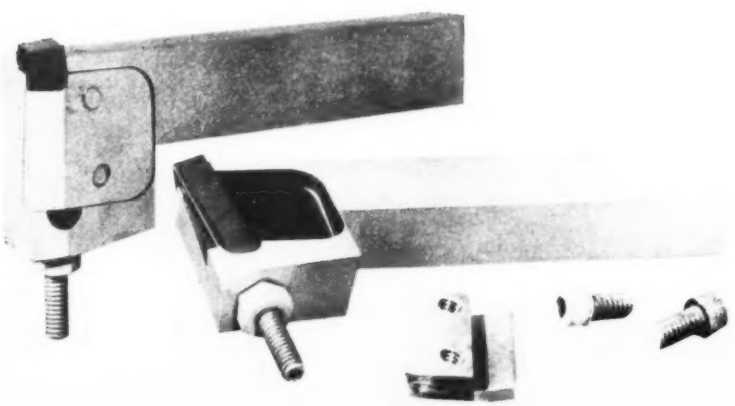


Fig. 2. The plate-type holder was the answer to many problems encountered on split-type designs. By utilizing replaceable parts that were subject to wear, tool costs and maintenance were reduced significantly.

Fig. 3. The most famous setup of modern day band-type holders is the multiple tooling used on crankshaft machining operations. The band-type holders have overcome most objections to former tool types.

clamp. Extremely effective over a wide range, this design completely eliminates the need for conventional ground-in or stepped chip breakers. For example, chip breaker adjustment on the Wesson Multicut holder ranges from 0.050″ to a maximum of 3 16″ away from the cutting edge. This design is the nearest approach yet to a universal chip breaker.

General Metalworking to Benefit

The introduction of "throw aways" will bring the economics of carbide to many small plants and job shops that previously felt they could not afford or were not equipped to take advantage of this superior cutting medium.

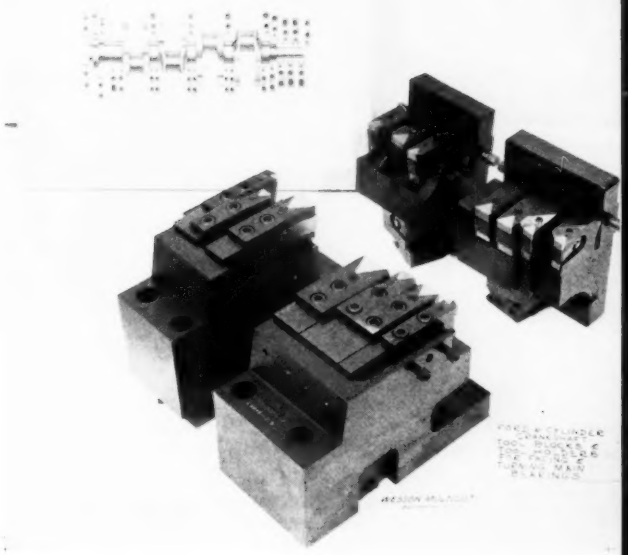
Of primary importance to the small shop will be the flexibility of the new holder designs with front and side clearance angles similar to present brazed type flat tools. Also, the flexibility in chip breaker adjustments will enable the small shop to broaden the application of a style to a greater variety of operations.

The limitations of previous type carbide inserts relative to clearance, excess waste of carbide on small-run production, chip breaker and design restrictions, and other factors made it economically unfeasible for many small job shops to use insert type tools. Most of these major objections have been all or partially overcome with the new style holders.

Equally important to all metalworking is the influence the new concept is exerting or will exert on present and future tool designs. At this early stage, the "throw away" concept is being utilized in several other tool designs.

Several highly effective "throw away" carbide insert type broach tools have been used. The significant savings resulting from these designs, especially in reduced downtime, attests the soundness of the concept.

The repeated and time consuming tool changes required with conventional broach spikes is eliminated with the "throw away" design. Except for breakage and accidents, only the initial setup and gaging is required. After that, it is only a matter of indexing the insert or discarding it and inserting a new one.



Adding to these important reductions in downtime of the broach is another feature of the Wesson holder. The locking clamp is loosened with one hand and rides up on the differential locking screw, while the operator removes the insert, air-cleans the seat, and replaces the carbide insert with the other hand. This is seemingly a small feature, but significant reductions in indexing time are realized, especially when 200 or 300 such tools require changing.

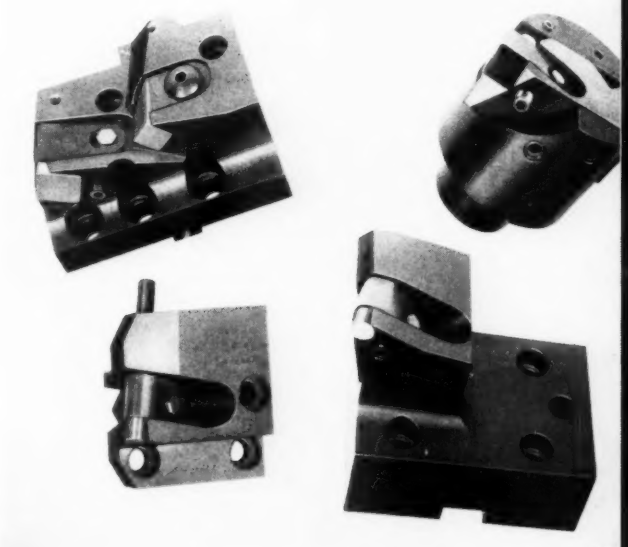


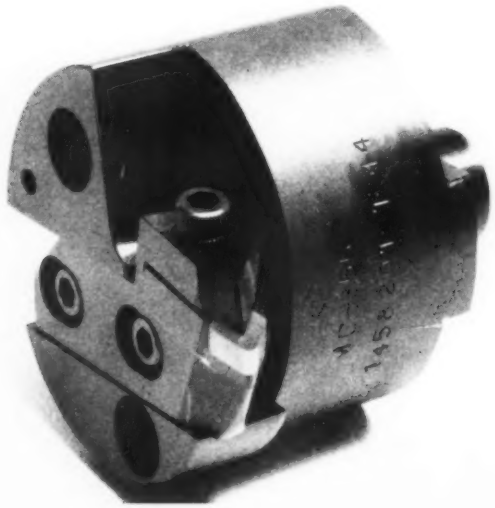
Fig. 4. The special band-type holders above illustrate the flexibility of the band principle. The newer tool designs for "throw away" inserts, however, surpass these holders on internal work and machining in closely confined spaces on medium and light cuts.

Fig. 5. Precipitating the trend toward the use of "throw away" carbide inserts on more and more machining operations is the standard design illustrated. Most firms have incorporated holder designs for use of round, square, and triangular-shaped inserts.

The most recent adaptation of the "throw away" idea in boring cutters is the special Wesson cutter illustrated in Figure 6. This cutter is currently forming an internal spherical radius on an automotive differential case.

Very particular tool design requirements, which had to be met on this operation, further illustrate additional advantages of the "throw away" design.

Fig. 6. The "throw away" insert concept is extending into boring cutter design and other tool types. This special boring cutter is currently forming an internal spherical radius on an automotive differential case to close tolerances.



Aside from the savings in setup time and elimination of carbide grinding, the "throw away" boring tool is holding extremely close limits on the radius to within +0.001". Even closer tolerances are necessarily held on the insert and holder itself.

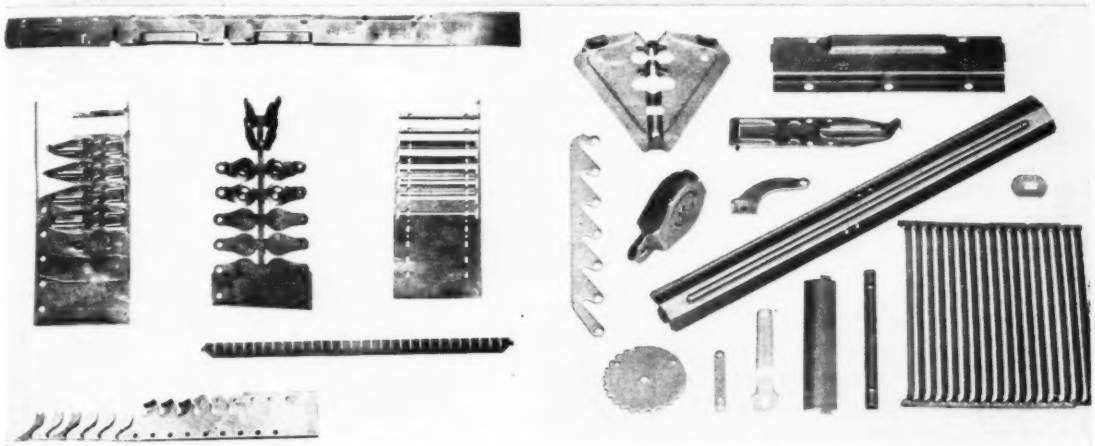
While the "throw away" idea is being tested now in several new Wesson milling cutter designs, it is believed that this concept will be extremely limited in its application to milling for some time to come.

From an economy standpoint, the only advantages gained with "throw away" milling cutter blades will be on those applications requiring negative rake angles. Only negative rake milling will provide a sufficient number of cutting edges to give economy.

Not to be overlooked is the part the carbide metals industry is playing in the development of modern cutting tool designs. Continued improvement in carbide grades has provided sufficient tool life per cutting edge for it to be economical to discard the carbide tip without regrinding.

In the final analysis, it was through cooperative research and development by metallurgists and engineers that made the new concept possible. The carbide and cutting tool industries will continue research programs directed toward the goals of greater tool life, broader carbide tool application, and generally improved efficiency of design and application of all carbide tooling.

5,000 PIECES - *or 200,000 PIECES*



A representative array of the various strips and components going into Hart & Cooley air conditioning and furnace products. Each is produced in one operation on H & W dieing machines tooled with progressive dies.

DIEING MACHINES INCREASE ACCURACY AND PRODUCTIVITY

AS PRODUCERS OF warm air heating and air conditioning diffusers, registers and grills, our problem was to reduce the in-work time of our components without sacrificing quality. The answer was found about eight years ago.

At that time we purchased a 100-ton dieing machine, built by Henry & Wright, Division Emhart Mfg. Co. Four years later we added a second Henry & Wright, a 200-ton job. The two machines enabled us to virtually do away with a complete press room at the same time we increased production.

These two machines enabled us to free about 15 conventional presses of varying sizes for other work. The H & Ws replaced up to five individual operations and increased die life tremendously. In one case, we have gotten as many as 250,000 hits before regrinding.

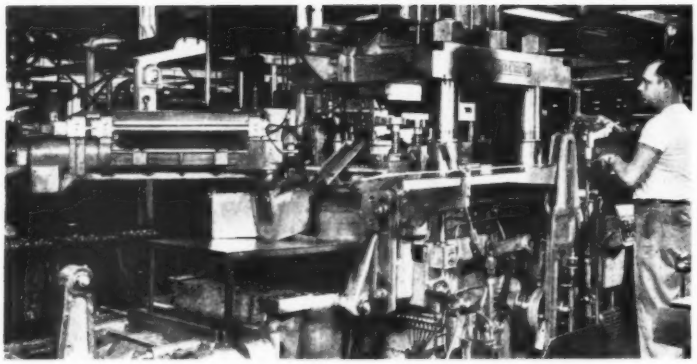
Our Henry & Wrights are operated from 16 to 24 hours daily, five or six days a week. We use them to turn out components from cold rolled commercial steel, ranging in thickness from .031" to .062". The machines, through progressive dies, perform every primary and secondary press operation except assembly. We run our presses at full capacity, getting up to 100 strokes per minute on a short feed.

Our product is made to exacting specifications. To assure accuracy, we build our own dies. So far, we have built 24 dies, varying from two to 15 stations, for our dieing machines. The accuracy with which these machines perform their task enables us to hold extremely close tolerances.

When we first installed our machines, it was obvious we had created some new problems. First, we required a better steel; meaning it had to be more accurately slit than the material demanded by our conventional presses. However, we found we could stay within mill tolerances and the better raw material substantially contributed to a better end product.

Then we realized that the H & W required a more skillful operator. To solve this we undertook an employee training program during which we not only instructed selected operators in the running of the machine, but showed them how to be their own die setters. On heavy dies, the operator gets help from the die setter, but makes his own minor adjustments.

by C. G. Lohmann
Mechanical Superintendent
HART & COOLEY MFG. CO.
Holland, Mich.

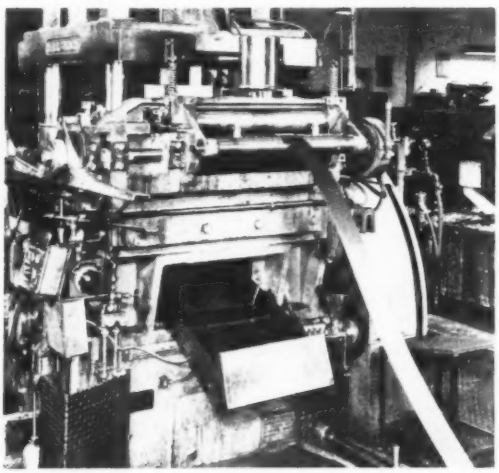


Operator's position at H & W control panel. Scrap cutter and out-bound roll feed, not needed on this job, have been swung away from front end of the machine.

We have found the H & Ws give us more accurate parts faster, eliminate human error through built-in machine accuracy and control, reduce floor-to-floor time, completely eliminate floor-to-machine time between primary and secondary operations, and that they do this with comparatively little down time.

On one job (a half-round hinge bar) we used to buy half-round stock, saw to length, form the corners, drill a hole in each end and deburr. Production was 500 finished bars an hour. Now, we feed flat stock into our dieing machines where it is automatically cut to size, shaped, cornered and pierced at the rate of 5,400 pieces an hour.

Flat strip stock feeding into 200-ton machine. On this H & W, strip stock running through a progressive gave a 1000% increase in production compared to previous tooling.



Although our average run varies up to 200,000 we have found it practical and economical to use our dieing machines on runs as small as 5000. Even with the time needed for a die change, we figure a 5000 run will be completed in two to three hours as compared with a full day on conventional presses.

We found our unit cost has been lowered by the reduction in the number of rejects and that our product found wider acceptance because of its generally higher quality.

Although the dieing machines were initially purchased only to increase our productive capacity, they soon became the basis of our press room modernization and replacement program. For example, we found that the machines not only substantially increased production, but they enabled us to eliminate some old presses and eased a labor shortage for us.

Generally, we have found that equipment that performs more than one task and is inherently adaptable to various degrees of automation, has made it possible for us to meet the increased competition in our field by reducing costs while maintaining or improving quality.

Heavy Forging Presses Now in Operation in Cleveland

Two of the world's largest hydraulic forging presses, a 50,000-ton Mesta and a 35,000-ton United, are now in operation in the sprawling 12-acre U. S. Air Force Heavy Press Plant adjacent to the Cleveland Works of the Aluminum Co. of America.

The presses enable lower cost, quantity production of structural members for today's high speed aircraft, with an exceptional strength-to-weight ratio. They can produce larger forgings, using the same unit pressures as smaller presses, or forgings with greater complexity, using higher pressures on the dies.

Already, the Air Force reports, designers have submitted plans that contemplate utilizing the presses in making fire walls, engine mounts, landing gear supports, and bulkheads. With the new presses, observers foresee closer tolerance forgings with a reduction in the amount of machining necessary for finishing.

Alcoa operates the new plant under a lease arrangement with the Air Force.

Tape Control of High Production Riveting

by Thomas H. Speller
President
GENERAL RIVETERS, INC.
Buffalo, New York

REVISING FASTMENT PROCESSES and production equipment to keep pace with the demand for heavier, higher performance airframe structures that are produceable at low cost, has been a real challenge to the airframe designer and equipment industry alike. The story in all its facets is as absorbing as any historical novel. It would include welding; metal bonding; and light machine work where hole punching and drilling is practical. We are concerned here with but one part of it, the present state of the art in automatic production of mechanical fastments in the heavier, high performance structural parts. Included are wing and empennage panels, beams and spars, bulkheads, doors, and floor structures.

For these structures, machinery is now being used to produce joints with extreme uniformity and reliability. If fuel tightness under flexure and vibration is one of the requirements, a variation of the NACA riveting process is used. Where mechanical integrity alone is the requirement, a somewhat faster process —drilling, rivet feeding, and squeeze heading— suffices. Figure 1 shows the steps in the former process and Figure 2 the latter.

It is interesting to note how the headless rivet shown in Figure 1 evolved for use in an automatic machine process. NACA riveting

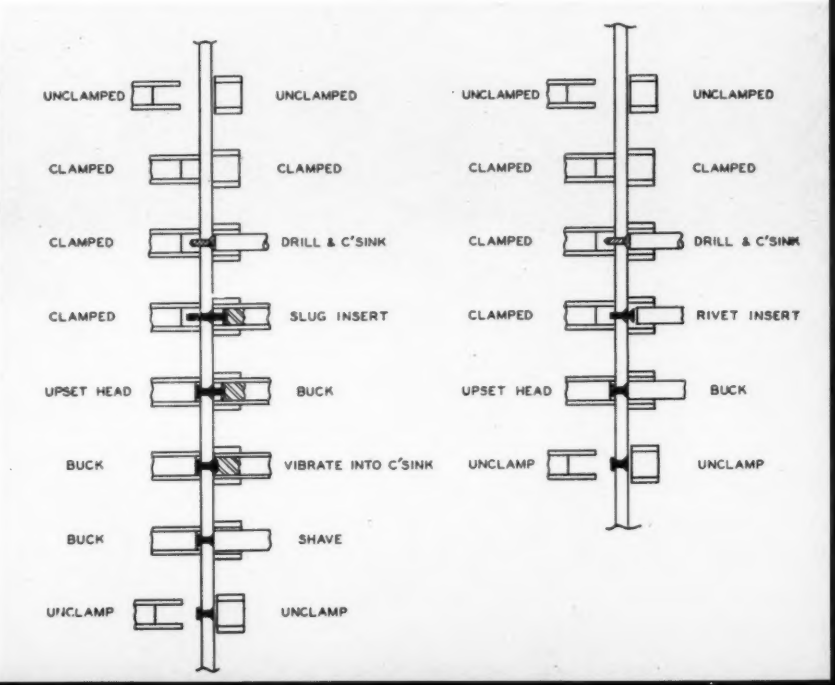


Fig. 1, left. Schematic cycle diagram for modified NACA process fuel-tight riveting, using headless rivet. Cycle time: 10 sec. for ¼" dia. rivets thru ½" stock. Fig. 2, right. Schematic cycle diagram for standard riveting. Cycle time: 4 sec. for ¼" dia. rivet thru ½" stock.

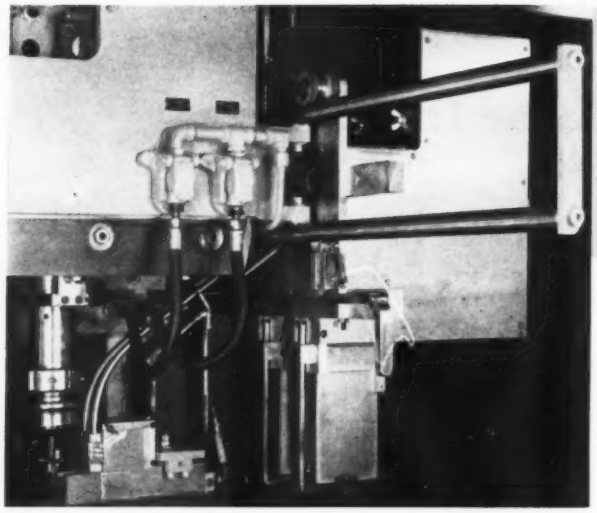


Fig. 3. Quick-indexing, multiple-container rivet hoppers facilitate rapid change from one diameter or length to another.

is a process where a standard universal head rivet is inserted from the side opposite the countersink. The tail is hammered into the countersink and shaved flush. This joint has been highly regarded for some time as combining high mechanical and fluid tightness under extreme conditions of fatigue.

Producing the NACA joint by machine in one automatic cycle is difficult, because drilling and countersinking should be done with one operation of the drill head. This at best leaves a slight edge at the drill break through. Feeding a rivet into the hole on the break-through side is very difficult. Feeding a headless rivet from the easier countersink side solved the dilemma, and also simplified the mechanical sorting and injection of the rivet into its feed fingers (Fig. 3).

The heart of the machine is its drill-countersink cutter. Much development was necessary to determine the best material, shape, grind, feed, and speed for this tool. In the telling, the problem would sound simple; but its solution required the best combined efforts of user, tool manufacturer, and machine producer to solve and systemize. To keep close hole tolerances, the drill point must be highly concentric and flutes must be extremely smooth to pre-

Fig. 4. Schematic over-all view of the Model G-53 work positioning table, showing tape-controlled longitudinal and transverse spacing drives and cam-controlled contour leveler. Note the 8-unit multiple hopper equipment on the associated machine.

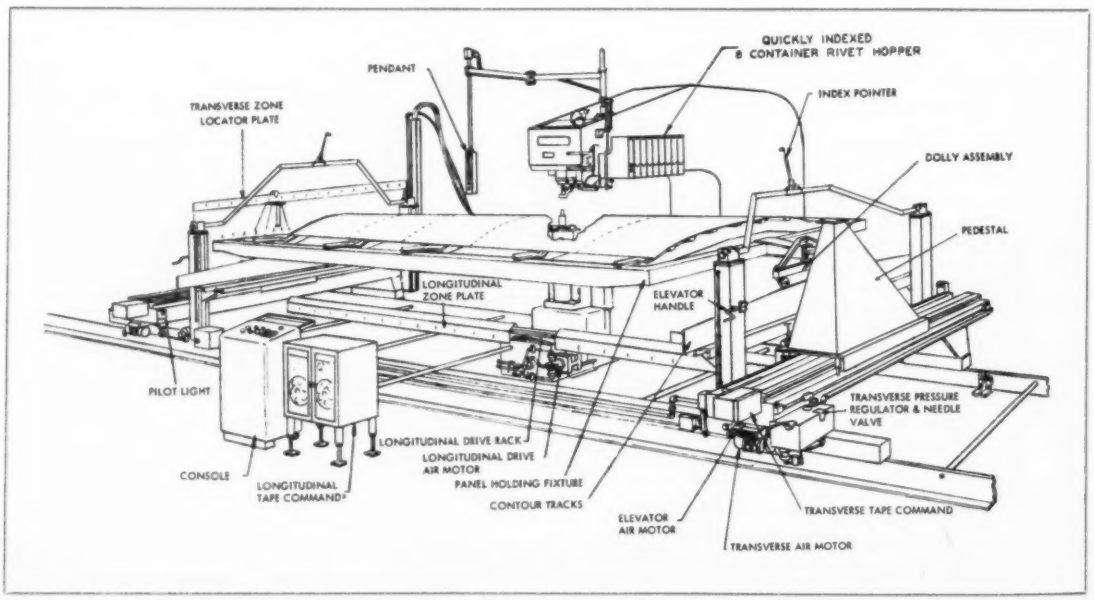


Fig. 5. Typical tooling required for automatic drill-riveting. Tools to the left, including offset anvil in center, attach to lower ram of machine and incorporate clamping sleeve as well as upsetting anvil. Tools to the right attach to the upper ram and incorporate rivet feed fingers.

vent chip adherence. Speeds and feeds also enter into the chip adherence problem, for maximum performance is necessary without benefit of any coolant other than a dry air blast.

To provide for tapered or stepped work sections, it was necessary to devise quickly changeable rivets, sorters or hoppers in multiples. This was solved by equipment shown in accompanying illustrations (Figs. 3 and 4). Up to eight different combinations of length and four combinations of diameters can thus be mounted. At any point where a change in rivet size is required, the machine halts and the operator is signalled. Changes are accomplished manually in minutes or seconds, without hand tools.

All machinery for making mechanical joints in one automatic cycle must, at each stop, first clamp up the work near the joint. Otherwise, drill chips cannot be kept from between the pieces being joined. In addition, a tight ungapped joint is necessary for high fatigue resistance and freedom from structure slip. The machines described here clamp the work between a pressure foot bushing on the drill side and a pressure sleeve around the rivet heading tool on the (lower) ram side (Fig. 5). This clamping pressure is controlled by an air cylinder contained in the rivet-heading ram.

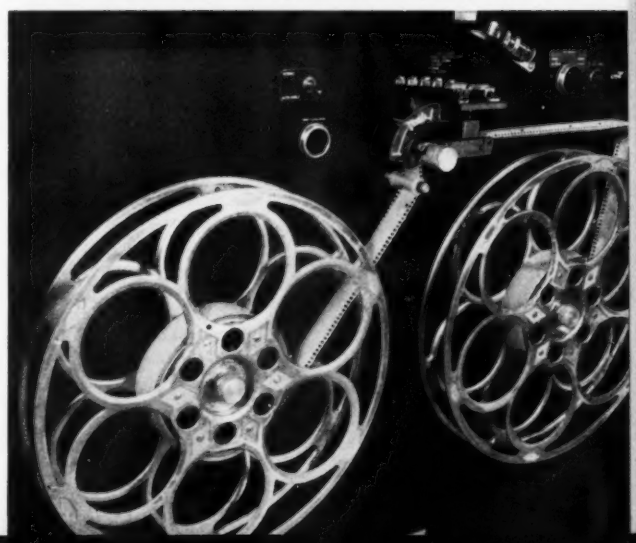
The drilling-riveting operation sequence is automatic. In the NACA process, Figure 1, tools are mounted at three positions on a shuttle arrangement. In the first position, the operations of clamping, drilling and countersinking are performed; at the second position, the operations of inserting the head and forming the heads; and at the third station, the operations of shaving and unclamping. In conventional riveting, two sets of tools on a shuttle arrangement are used—clamping, drilling, and countersinking at the first station, and rivet forming and unclamping at the second. Feed fingers are interchangeable, and tools need not be changed for a change in rivet length. A fast manual change of tools is necessary, however, for a change in rivet diameter.

Adequate joint making is less than half the story. The work must be moved through the machine efficiently, and means for spacing the work must be available. This is a problem which calls forth great ingenuity in machine design. Shapes and sizes vary, and the contour of aerodynamic surfaces must also be considered. An example of such handling equipment is the model G-53 (Fig. 4). Other excellent handling equipment was described in an earlier article in this magazine.*

The model G-53 handling table was devised as one having the higher degree of flexibility for different shapes and sizes of flat or contoured panel work. It embodies longitudinal and transverse tracks for motions in the X and Y axes. In addition, it has mechanical cam plates for turning the part when contoured. Transverse spacing on each end carriage is independent so that non-parallel rivet rows can be lined up with the longitudinal tracks.

*Clinton A. Bay, Convair—Fort Worth, "New Method Reduces Precision Riveting Costs", TOOLING & PRODUCTION, April '55.

Fig. 6. Tape command controls every dimensional and cyclic movement of the General Driv-matic riveting machine. The equipment shown is for spacing control in the longitudinal direction. Reels hold up to 2000' of tape, which passes through pick-up head. Reels for control of transverse row spacing need not be as large, as distances moved transversely are not usually as great.



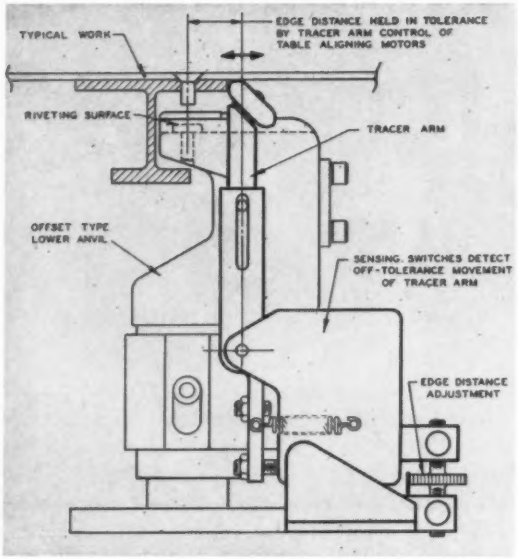

TYPICAL WORK
EDGE DISTANCE HELD IN TOLERANCE BY TRACER ARM CONTROL OF TABLE ALIGNING MOTORS
RIVETING SURFACE
TRACER ARM
OFFSET TYPE LOWER ANVIL
SENSING SWITCHES DETECT OFF-TOLERANCE MOVEMENT OF TRACER ARM
EDGE DISTANCE ADJUSTMENT

Fig. 8. Tracer control attachment for an offset lower anvil, shown schematically. When component edges vary from a theoretically straight line, edge distance may be held to tolerance by tracing some surface of the stringer which is parallel with the rivet row. The tracer signals deviations to the table-aligning motor to correct such misalignment.

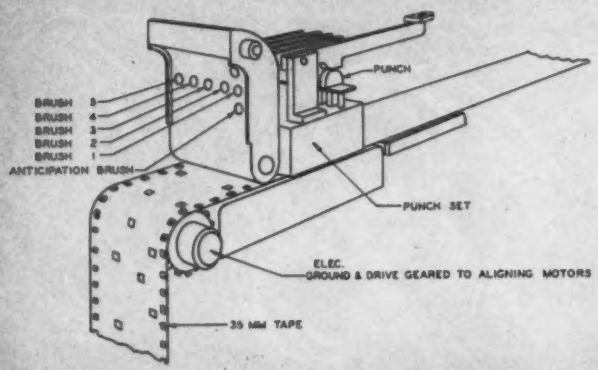
Spacing of rivets along rows and transverse distances between rows are controlled by a system of synchronized perforated tapes. Perforations on the tapes are positioned so as to correspond with stop stations required for the part. Accompanying illustrations show this spacing control (Figs. 6 and 7). Since it is usual that many more stops are required in the longitudinal than in the transverse direction, the tape controlling longitudinal travel serves as a master tape and is located at the operator's console. The stop stations are arranged serially on many feet of tape wound on reels holding up to 2000 ft. The table may run back and forth, but the tape always advances by means of electrically operating reversing clutches and gear.

Accuracy of this spacing system is well within the requirements for mechanical fastment center distance. However, control of edge distance is another story. Edge distance control is an important structural feature in airframe work. It is a much more important consideration than that of running a theoretically straight line. To accomplish this control, electrical sensing devices have been devised which mechanically track on the edge of stringers and stiffeners (Fig. 8). These sense a deviation from the straight line and continuously adjust the transverse position so that edge distance tolerances are effectively held.

While the tapes are primarily spacing controls, they also perform other functions. Perforations that control the spacing also serve to energize the circuit controlling the drilling-riveting sequence. Additional perforations on parallel channels on the same tapes signal the machine's ram to drop to a wide opening to pass a structural obstruction on the part or handling cradle. Also they signal the operator at ends of rows, or when changes in rivet length are necessary. They can be set up to provide a signal to couple end of row with transverse motion so that the machine will not stop at the row end but automatically go to the next row, reverse itself, and start down it without operator attention.

During the past year the complete assembly fixture for a skin stringer assembly of a jet medium bomber wing cover has been mounted on a G-53 handling table. Undrilled details are loaded in this fixture and joining accomplished in a nearly automatic sequence. Results to date have illustrated what a high degree of quality control under the most exacting requirements can be accomplished economically through automation in this phase of airframe fabrication.

Fig. 7. Tape command signal pick-up head shown schematically, with individual brush pick-up functions. In operation, the head is closed down over the tape.



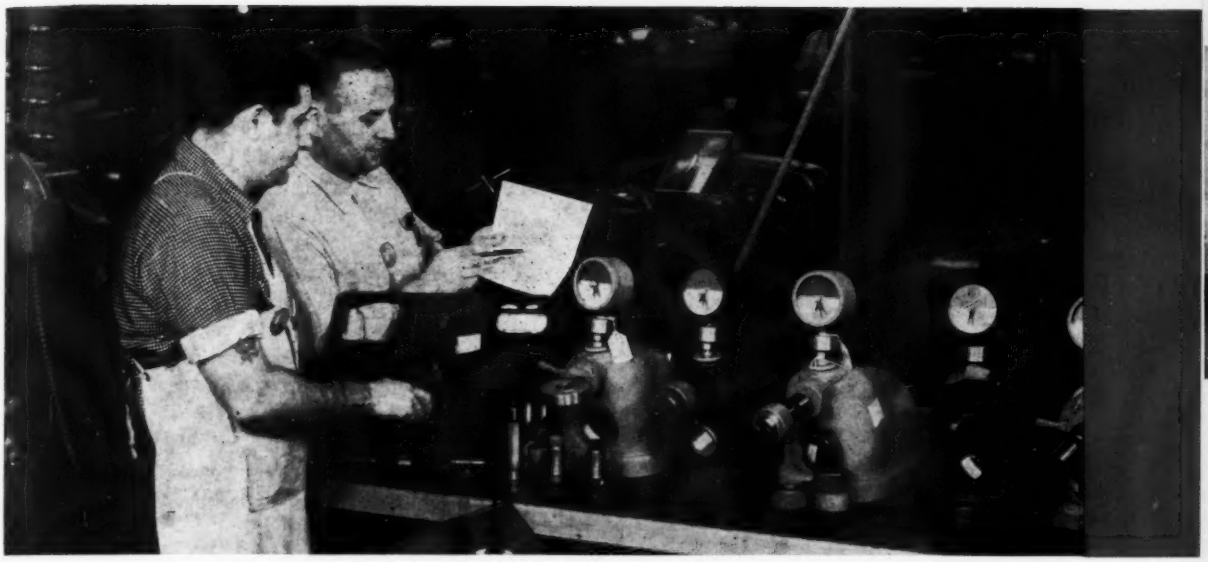
INDIVIDUAL BRUSH PICK-UP FUNCTIONS

Spacing in Longitudinal Direction

Anticipation Brush	— Anticipates stop signal, and lowers velocity of work positioner
Brush 1	— Work positioner stop signal
Brush 2	— Tape synchronizing signal
Brush 1 and 3	— Prime machinery by-pass signal resets clamping mechanism to allow for by-passing obstruction on work surfaces
Brush 4	— Blank signal
Brush 1 and 5	— Ram cut-out signal stops work positioner at end of row and locks out prime machine action

Spacing in Transverse Direction

Brush 1	— Work positioner stop signal
Brush 2	— Work positioner stop signal
Brush 3	— Work positioner stop signal
Brush 4	— Work positioner stop signal
Brush 5	— Tape synchronizing signal



Borematic area of the Machine Shop showing gaging equipment permanently assigned to this area and considered as part of the machine tooling. Trend is toward such "variables" equipment.

PLANT-WIDE CONTROL

Assures Quality of Electro-Mechanical Control Systems and System Components

by Bernard Siegel
Quality Engineer, Arma Division
AMERICAN BOSCH ARMA CORPORATION
Garden City, New York

DESIGN and production requirements at Arma Division range from a single precision component to a great many, identical, complete electro-mechanical systems. The resulting diversity of production, from the standpoint of quantity and variety, requires a flexible quality organization to cope with the great range of problems.

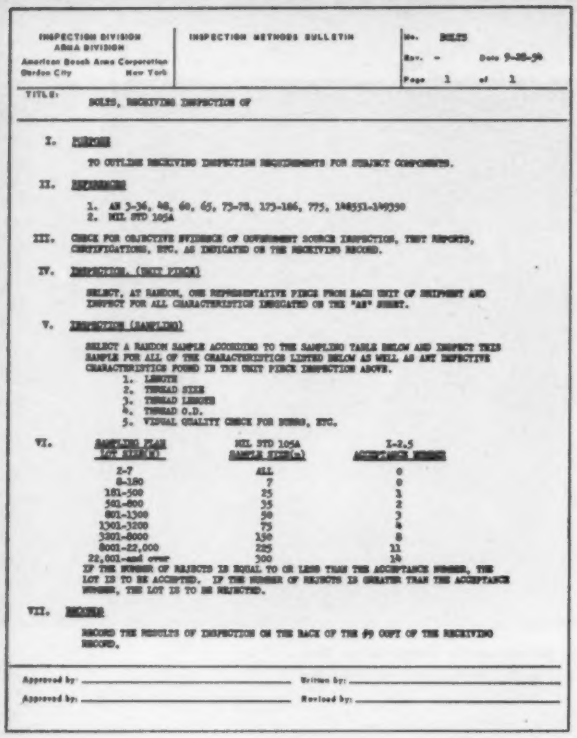
The common denominator in all cases, regardless of quantity, is precision. The over-all system performance requirements demand strict adherence to high standards imposed upon ourselves and vendors alike. The basic philosophy, therefore, is one of an over-all control of those factors affecting the quality of our product; by viewing the entire plant as one productive unit and correcting deficiencies where they appear, we are able to overcome these problems of variation.

Receiving Inspection

Our object in Receiving Inspection, as in other firms, is to assure ourselves of obtaining parts made to the same high standards of quality demanded of our equipment and to distribute our inspection manpower and time so that we secure maximum protection for our inspection dollar. We are faced with the problem of having roughly 30,000 parts and 2000 vendors, and ordering quantities within the range of 1 to 200,000 pieces or so.

In order to handle this range, we have

Diversity of production requires a flexible quality organization. With such an organization, Arma enjoys the distinction of being a leading designer and manufacturer of precision fire-control equipment, computors, navigational instruments, and "brain blocks" (servo-mechanism units for industrial automatic control).



INSPECTION DIVISION
ARMA DIVISION
American Bosch Arma Corporation
Garden City New York

INSPECTION METHODS BULLETIN

No. BMIB
Rev. -
Date 9-28-50
Page 1 of 1

TITLE: BOLTS, RECEIVING INSPECTION OF

I. PURPOSE

TO OUTLINE RECEIVING INSPECTION REQUIREMENTS FOR SUBJECT COMPONENTS.

II. REFERENCES

1. AN 3-36, 48, 60, 65, 73-78, 173-186, 775, 144551-144550
2. MIL STD 105A

III. CHECK FOR OBJECTIVE EVIDENCE OF GOVERNMENT SOURCE INSPECTION, TEST REPORTS, CERTIFICATIONS, ETC. AS INDICATED ON THE RECEIVING RECORD.

IV. INSPECTION. (UNIT PIECE)

SELECT, AT RANDOM, ONE REPRESENTATIVE PIECE FROM EACH UNIT OF SHIPMENT AND INSPECT FOR ALL CHARACTERISTICS INDICATED ON THE "AS" SHEET.

V. INSPECTION (SAMPLING)

SELECT A RANDOM SAMPLE ACCORDING TO THE SAMPLING TABLE BELOW AND INSPECT THIS SAMPLE FOR ALL OF THE CHARACTERISTICS LISTED BELOW AS WELL AS ANY DEFECTIVE CHARACTERISTICS FOUND IN THE UNIT PIECE INSPECTION ABOVE.

1. LENGTH
2. THREAD SIZE
3. THREAD LENGTH
4. THREAD O.D.
5. VISUAL QUALITY CHECK FOR BURRS, ETC.

VI.

SAMPLING PLAN FOR LOT SIZE (N)	MIL STD 105A SAMPLE SIZE(n)	I-2.5 ACCEPTANCE NUMBER
2-7	ALL	0
8-180	7	0
181-500	35	1
501-800	35	2
801-1300	50	3
1301-3200	75	4
3201-8000	150	8
8001-22,000	225	11
22,001-and over	300	14

IF THE NUMBER OF REJECTS IS EQUAL TO OR LESS THAN THE ACCEPTANCE NUMBER, THE LOT IS TO BE ACCEPTED. IF THE NUMBER OF REJECTS IS GREATER THAN THE ACCEPTANCE NUMBER, THE LOT IS TO BE REJECTED.

VII. RECORDS

RECORD THE RESULTS OF INSPECTION ON THE BACK OF THE #9 COPY OF THE RECEIVING RECORD.

Approved by: Written by:
Approved by: Revised by:

Fig. 1. Typical "Inspection Methods Bulletin" of the type utilized in Receiving Inspection.

grouped these many parts under major item headings, e.g. condensors, resistors, etc. The Inspection Methods Bulletin (Fig. 1) establishes the "standards of acceptance" for an item. By applying sampling inspection to the characteristics of greater importance and inspecting a single piece for those characteristics more likely to be controlled by the manufacturing process, we concentrate inspection where it is most necessary. A "Visual Quality Check" is made for all characteristics and workmanship factors. Inspection results are recorded on the Receiving Record copy of the Purchase Order and are reviewed monthly. Vendors with a continual record of poor or marginal performance are brought to the attention of Purchasing by a special report, and the problems are discussed with these vendors in an attempt to improve poor performance.

It is of greatest importance that the system of specifying standards, sampling, recording, and reporting be a living system; for this reason, a Quality Engineer is assigned the task of reviewing and analyzing costly reject items. As a result of this review, acceptance standards may be changed, A.Q.L.'s revised, interim expedients adopted, or vendors changed. The Acceptable Quality Level and the acceptance standards are determined by Quality Control on the basis of Engineering and Government requirements, past experience, complexity, end use, and considerations of economy.

Machine Shop

The Arma Shop approaches the ultimate in job-shops, being equipped to perform practically all types of machining and processing operations. Facilities and techniques are available within the shop for setting up areas or lines for the mass production of specific items. In all cases, precision and/or adherence to Arma and Government Specifications is a prime factor, a large portion of our dimensions being to tenths and our special processing having strict dimensional and control requirements.

The basic approach to the resulting problem of producing parts to specification is a cooperative attempt of all involved departments to designate machines, methods, tooling and gaging equipment for the successful production of parts. We recognize that proper gaging equipment geared to the tolerance and quantity requirements of the part is as much a portion of proper preparation for production as proper tooling; and, consequently, gaging requirements are initially considered and included with methodizing. Where production is in sufficient quantity, a particular machine is actually assigned permanent gaging equipment, considered as part of the machine.

Memo to: T. R. Krause (3) Sheet No. 1

Subject: Machine Operational Accuracy Report Machine Name Bardon & Oliver #5 Turret Lathe
Machine No. 6

Copy to: R. Davidson (3) O. Haberman (3) N. Moore E. Toner Location Arma Corp., Bldg.S-2, Mineola
C. Foss R. Hodges K. H. Rockey F. Walthall Frequency of Check
E. Gittens R. Mahland S. Smith

M.O.A. No.	Date	Oper. Clk. No.	Part No.	Part name	Material	Type Dimension	Dimension	M.O.A.	Remarks
1	4/21/53	8721	715638-4	Housing	Aluminum	Outside Diameter	±.002 1.447	.0016"	
						Inside Diameter	±.001 1.302	.0020"	
						Depth	±.005 1.306	.001"	
									C. J. Thaler Quality Control Eng. Section Inspection Department

Fig. 2. Typical "MOA" report indicating part tolerances and machine capability.

The trend at Arma is towards equipment capable of variables measurement, viz. air gages, dow gages, comptor plugs, optical comparators, etc., for in-process inspection. Variables equipment has been found to be a significant aid in setting and maintaining dimensions on our machine tools. When inventory, wear, and variety are considered, variables equipment is at least comparable in cost to attribute equipment.

Our program of Quality Control in the shop serves three major functions: 1. Control and Correction, 2. Preventative Inspection, 3. Check or Final Inspection. As a result of reject and scrap figures, investigations are performed and action requested of the accountable departments. If the investigation so indicates, a control chart is assigned to the operation. In certain cases, charts are assigned prior to the accumulation of reject information on the basis of past experience or anticipated difficulty determined from tolerance requirements and process capabilities. Roving Inspection is widely utilized to guide the shop in avoiding excessive rejection, and finally, finished parts are 100% or sample inspected (dependent on quantity) for all characteristics.

Fig. 3. Grinding machine operator and roving inspector utilizing air gage and chart to hold parts within "tenth" tolerance requirements.

In conjunction with Methods and the shop, Quality Control performs studies of the Machine Operational Accuracies of our equipment. This information is then used for repair of machines, change of methodizing, change of tooling, change of specifications, etc. (Fig. 2).

In addition to the surveillance performed by the Roving Inspector, a Quality Engineer is assigned to the shop area and checks to see that Operation Sheets are complied with (as to operational sequence and machine assignments), that charting is properly maintained in the designated areas, and that proper action is taken as a result of charting information.

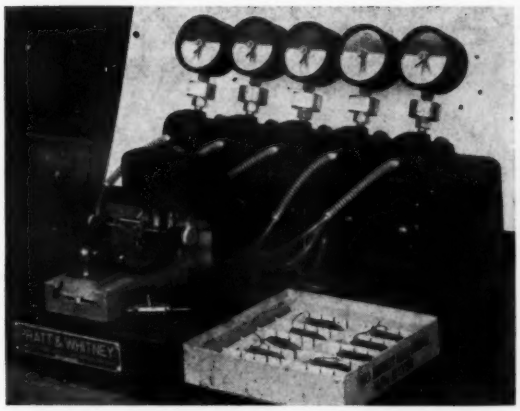


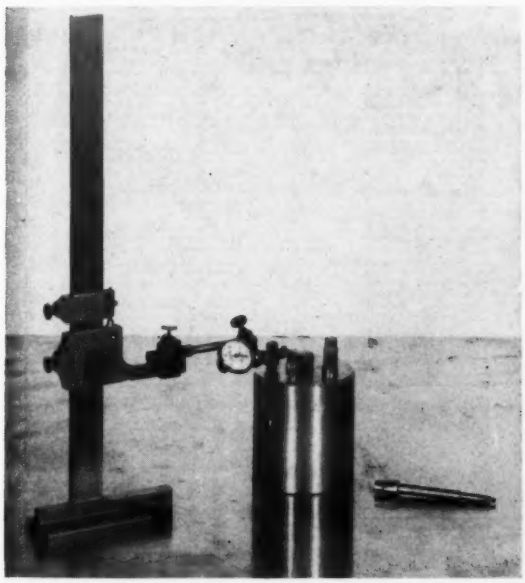
Fig. 4. Multiple air gaging fixtures are frequently used in quantity production for checking completed part for all diameter and concentricity requirements simultaneously.

For small production quantities, universal inspection equipment is utilized, e.g. Pla-Cheks, surface plates, height gages, indicators, etc. For larger production quantities, special equipment is utilized, e.g. multiple station air gages, dow gages, elaborate checking fixtures, comparators, etc. Some examples of the techniques and equipment we are discussing are illustrated by Figures 3 to 6.

Assembly

The outstanding performance of Arma's instruments is intimately associated with the precision of component parts and care taken

Fig. 5. Special fixture for length measurements on stepped shaft. The holes in the fixture are fitted with bushings so that, at each of the four positions, the shaft is supported from a different shoulder. Bushing lengths are determined so that, no matter which length is measured, the indicator (pre-set to a fixed button) reads zero if the shaft lengths are to nominal.



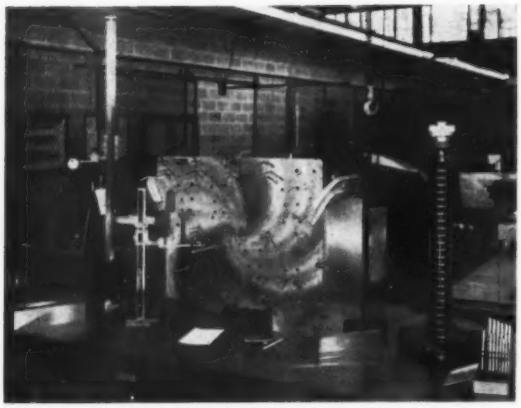


Fig. 6. Setup in Tool Inspection for checking out special measuring fixture. This fixture will be used for checking large quantity production parts.

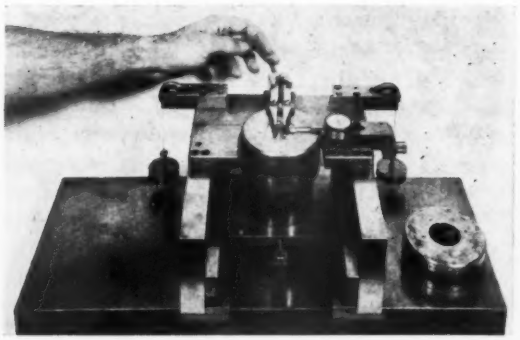


Fig. 8. Fixture for checking shaft "side shake" to "tenths." The indicator and unit being checked are firmly mounted on a solid base, and the load is alternately applied to each side of the shaft. The side shake is read from the indicator which is at a fixed position along the shaft extension. This setup makes consistent repeat readings possible.

in assembly and wiring. It is in the area of assembly, of course, that rejections, rework and scrap are costly. For this reason, the assembly area can be considered as being the "nerve center" of Quality Control. From this area, we receive "gripe" sheets and inspection reports which are accumulated, plotted and analyzed by Quality Control. This information is then utilized for corrective action in the Shop, Inspection, Methods, Engineering, or elsewhere. Complex assemblies have individual "check lists" which accompany them through Inspection and establish standards of acceptance for the assemblies.

A general surveillance of the assembly areas is maintained by Quality Engineers who spot check to make certain that our practices are in accord with applicable Government and Arma Specifications. These men are empowered to certify acceptability or to validate criticisms picked up by the inspectors. Decisions are based on validity of the rejection, workmanship, specification requirements, etc. In addition, in certain component areas, units are selected at random each week and taken completely apart by a Quality Technician. The units are checked for all dimensional and quality characteristics, the information recorded (Fig. 7), and appropriate action taken to correct any deficiencies. In this manner, we are often able to spot deficient areas and thereby avoid situations requiring expensive rework of assembled components and/or instruments.

Understandably, the electrical and mechanical tests of components and instruments constitute a complex procedure. Same mechanical check methods used on synchros are illustrated by Figures 8 and 9.

Special Controls

There are a number of key points in our manufacturing operations. Without controls at these points, we would find it difficult or even impossible to manufacture our precise and complex equipment; therefore, we maintain a modern, well-equipped and air condi-

. . . Continued on page 93

QUALITY CONTROL INSPECTION OF ASSEMBLED ROTATING COMPONENTS
PRIOR TO FINAL MECHANICAL INSPECTION

UNIT TYPE 1F SYNCHRO DATE 12/20/64
ENG. NO. 1406 CODE NO. 394 TEMP. } NO. 16293
SERIAL }

A. Fully Assembled Unit
1. Appearance: Cleanliness ✓ No Scratches, nicks, dents ✓ No burred screws ✓ No cracks or chips in plastic parts ✓ All terminal designations are clear and legible ✓
2. Threads, Internal and External: Not damaged ✓ Clean ✓
3. External Leads: Complete insulation — No kinks or hidden splices X Correct identification X
4. Securance of Assembly: All terminal lugs, covers, shim plates, etc., are securely mounted ✓ All screws tight ✓
5. Nameplates: Correct type designation, drawing No., etc. ✓ Correct filled-in information ✓ Securely bonded to case ✓

B. First Disassembly Stage - Terminal Board Cover Removed
1. Soldered Connections: Joints must be neat, clean and free of excess resin X No cold solder joints X No excess solder X No loose wire strands at soldered joints X Joints are mechanically secure with 3/4 to 1 turn about terminal X
2. Brushes: Tension on each brush spring ✓ Position of brushes on collector rings as they are rotated ✓ No kinks in springs ✓ Brush contact surfaces clean and free of pits ✓ Natural position of (2) brushes correct X
3. Brush Blocks or Terminal Rings: Proper fits ✓ No cracks or chips in plastic parts ✓
4. Collector Ring Sub-Assembly: No visible runout ✓ No cracks in plastic ✓ Cleanliness and finish of the metallic rings ✓ Corrosion proofing lacquer at exposed end of mounting pin X Solid gold ring on all (2) units (no gold plated rings) X
5. Miscellaneous: Soundness of assembly ✓ Parts correctly assembled ✓

C. Second Disassembly Stage - End Cap Removed and Rotor Lifted Out
1. Rotor: No loose wires ✓ All lacquered surfaces have continuous, uniform coatings free of scratches and "runs" ✓ Clearance between bearings and windings ✓ No signs of rotor hitting or rubbing some other object while rotating ✓
2. Stators: No loose wires ✓ All lacquered surfaces have continuous, uniform coatings free of scratches and "runs" ✓ Leads are secure to end turns ✓ Lead wire insulation undamaged ✓
3. Miscellaneous: Cleanliness of all parts ✓ Correct hardware properly assembled ✓ Correct bearing lubrication ✓

REMARKS: ① VARNISH BUILDUP ON END TURN INSULATOR, MAY CAUSE INTERFERENCE WITH DAMPER WHEEL. IMPREGNATION INSPECTION ALERTED

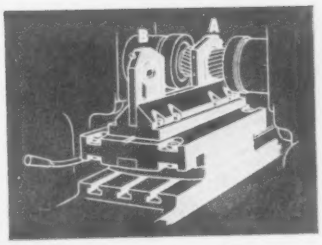
Inspected by L.S. LINCOLN JR

Fig. 7. Check list of the type used for spot checking current production on assembled components.

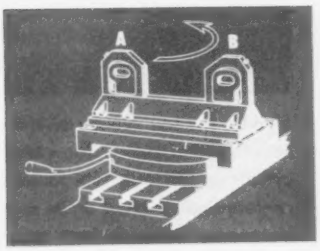
There's No Catch to this *Something for Nothing* SETUP

CINCINNATI No. 2-24 DUPLEX AUTOMATIC MILLING MACHINE

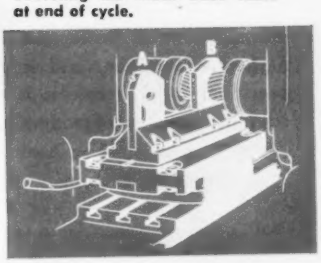
Milling two sides simultaneously, on cast iron pump parts at the rate of 60 per hour, employing the index base method of milling on a CINCINNATI No. 2-24 Automatic.



Milling the part in fixture A. Plenty of time to reload fixture B.



Swiveling the Index Base table at end of cycle.



Milling the part in fixture B. Plenty of time to reload fixture A.

Cost wise, the all-Cincinnati equipment illustrated here actually does give you something for nothing. The trick is accomplished with a setup that takes advantage of the free time during the feeding stroke of the table. The above drawings show how it works. ¶A CINCINNATI No. 2-24 Duplex Automatic Milling Machine is equipped with a Cincinnati Index Base (standard attachment) for the operation of milling two sides of pump parts. The entire production cycle proceeds along the following pattern: at the completion of the milling cut, the table automatically returns to starting position, the operator indexes the Index Base table 180°, and the cycle automatically repeats. **Notice that there's no time allowance for handling the work.** This item, usually a considerable cost factor, is free; accomplished while the cutters are at work. ¶This is a typical example of cost reduction by CINCINNATI No. 2-24 Automatic Milling Machines. They have many features of value in operating at rock-bottom costs:

Cycle selector unit . . . hundreds of variations; changed in a minute or less. **Automatic two-way table cycles. Single lever table control. Automatic spindle stop. Automatic backlash eliminator.**

How do the foregoing features strike you as potential cost reducers in your shop? You can get the entire No. 2-24 specifications and illustrated advantages by writing for catalog No. M-1760-1.

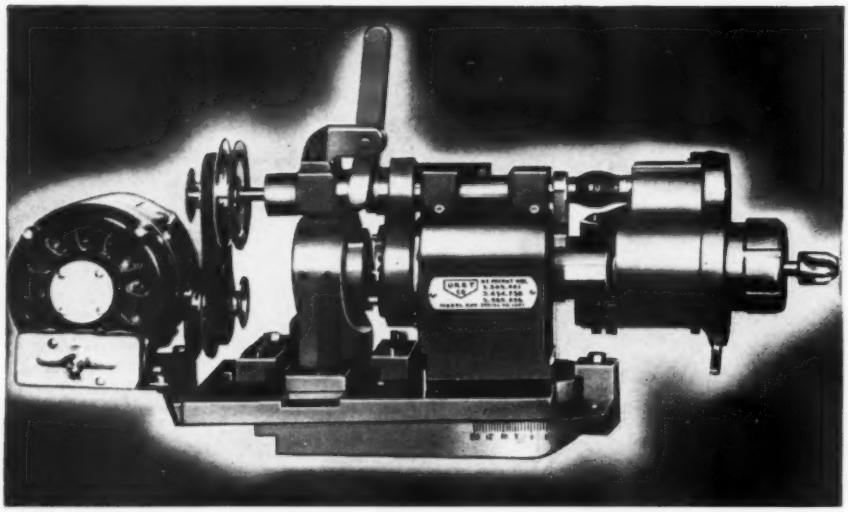
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

CIRCLE INFORM-A-GRAM KEY NO. 911

Precision CIRCULARITY GRINDING ATTACHMENT



Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, radial relief, form and radial relief together, tapered cylindrical and straight cylindrical. Cutting tool to be produced or reworked is held in collet or between dead centers and revolves on its own axial center. Where full length of spiral cutting tools is to be ground for both form and radial relief, the Circularity Grinding Attachment travel is similar to an O.D. grinder, which insures fine finish, back taper and accurate size.

The Detroit Reamer & Tool Company Model 500 Circularity Grinding Attachment shown above is faster, easier to handle, has positive control, greater adaptability, rugged construction, and is engineered and precision built to provide the finest in precision work. Therefore, it will be of invaluable assistance to anyone whose tooling standards must meet modern production requirements.

You Can Grind Tools Like These on a **DETROIT REAMER CIRCULARITY GRINDING ATTACHMENT**

Special Cutting Tools of DEPENDABLE QUALITY

The Detroit Reamer & Tool Co. Plant is equipped with the finest in modern machinery and inspection facilities to provide you with the ultimate in precision tools. Our Engineering and production personnel with 35 years of empirical knowledge behind them are completely qualified to expertly handle your tool needs. For dependable cutting tools—specify Detroit Reamer & Tool Co.

DETROIT REAMER & TOOL CO.

2830 E. SEVEN MILE ROAD • DETROIT 34, MICH.

D R & T COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 92

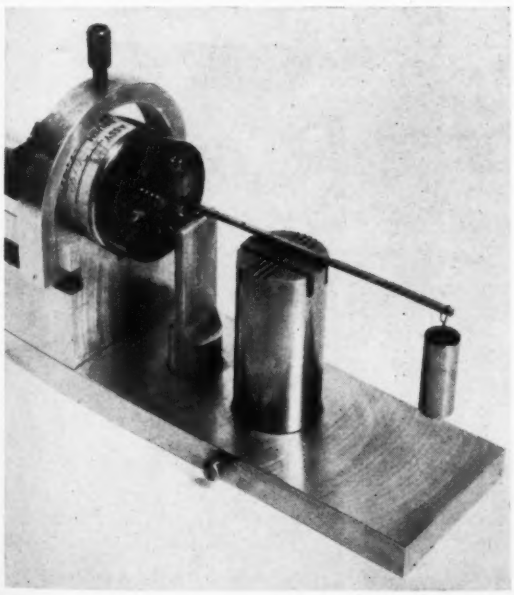
. . . Plant Wide Control, from page 90

tioned Gage Room and a supplemental Tool Inspection Area. Records of inventory and inspection periods are kept, and the continuing task of tool and gage inspection is assigned to these functions. Arma is thereby able to establish an authoritative standard of measurement, minimize shop-inspection error and argument, and minimize rejections due to gage and tool error (Fig. 10).

Chemical Processes and Raw Materials are controlled by the Materials Test Engineering Section of the Inspection Department. Routine, periodic checks are made of processes; records maintained by shop personnel are reviewed; process samples are analyzed; and corrections are made as necessary. Certain processes also require that the end products be chemically and physically examined for determination of satisfactory processing. Raw materials are checked for certifications or test reports; or, at the discretion of the laboratory, they are tested for physical and chemical conformance to applicable specifications in the well equipped laboratory (Fig. 11).

Casting Control is typical of the manner in which Arma Inspection deals with these special control problems. A pre-production sample casting is required of vendors who have not previously submitted castings of a particular part number. The sample casting is "layed out" by Receiving Inspection to assure that it is completely machinable and that bosses, holes, etc. are properly located. The casting is then sent to the Materials Test Laboratory where it is X-rayed and any necessary metallurgical tests are made. If the inspection of the sample is satisfactory, the vendor is authorized to pour the production lot; if not, the vendor is advised of his deficiencies and a new sample requested.

Fig. 9. Rig for checking brush spring pressure. Brushes are individually checked and adjusted between specified maximum and minimum pressures to assure proper contact friction.



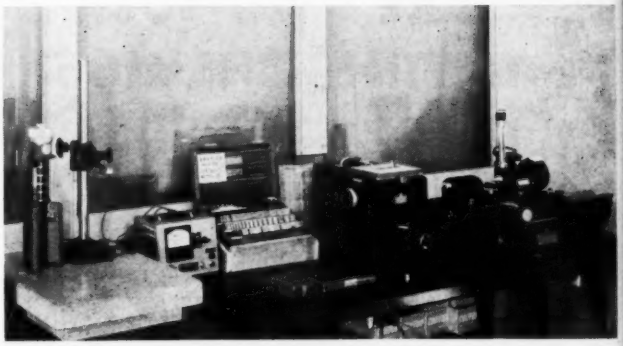
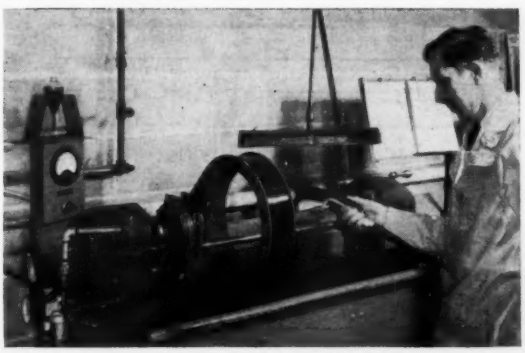


Fig. 10. A portion of the Gage Laboratory showing the internal and external measuring machines, electronic height gage, and Pla-Chek.

Production castings, accompanied by two test bars from each heat, are checked by Receiving Inspection for visual defects (core shifts, pattern shifts, cracks, porosity, etc.) and are then sent to Materials Test Engineering where the castings are X-rayed and the test bars metallurgically checked as required. The inspected castings are then released to the shop for further processing or are rejected.

Installation of this and other control systems has been an additional factor in enabling Arma to avoid rejections, to avoid uncovering defective material after expensive machining has been performed, to lower rejection and rework costs, and has aided Arma in building equipment to rigorous standards of performance.

Fig. 11. The well-equipped Materials Test Laboratory includes the Magnaflux unit shown here, plus X-ray, metallograph, tensile testing unit, chemical analysis and other equipment.



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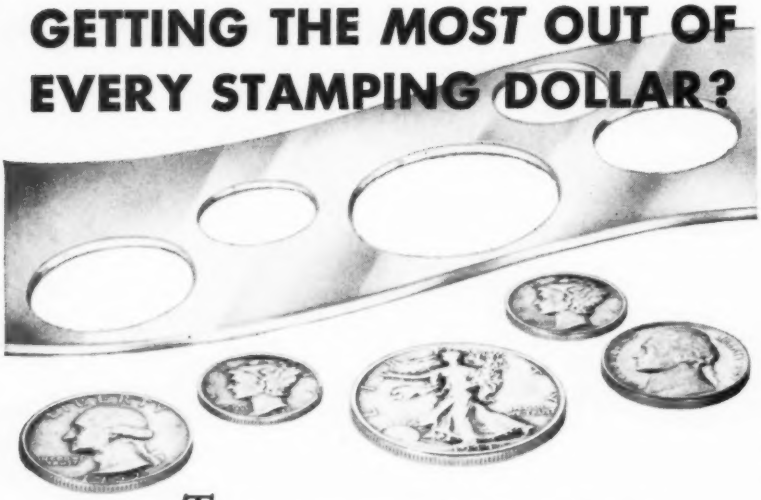

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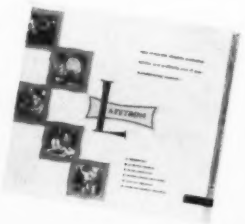

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Manufacturers of the Layco Tru-Align Die Setup

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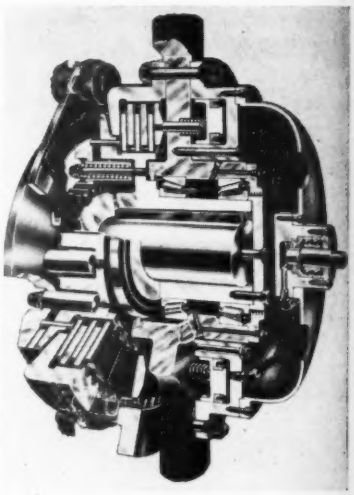
NEW COMBINATION CLUTCH AND BRAKE FOR PUNCH PRESSES

A new combination air friction clutch and spring released brake has been developed by E. W. Bliss Company. Identified as Type-M, it was designed for crankshaft mounting on new presses and can making machinery and for replacement of old style clutches.

The new clutch is a compact combination design, and requires only a single valve for operation and control. Heating problems are practically eliminated because it does not have start and stop back gearing. Cool running operation is assured by many built-in ventilation features. Long-lasting, hard linings are provided for maximum wear, and no adjustments are necessary. In addition, these clutches and brakes are equipped with anti-friction roller bearings.

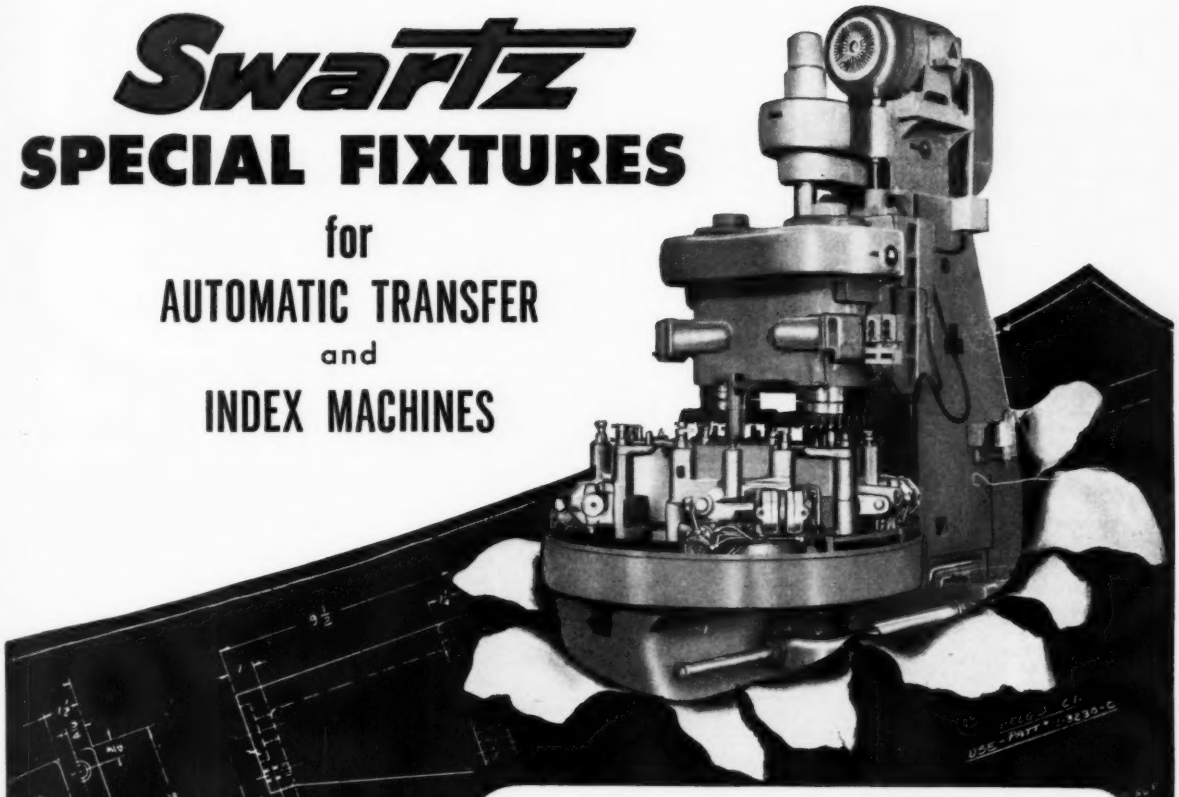


The Type-M clutch is designed to simplify the modernization of old Bliss presses. It allows the use of existing flywheels and crankshafts with a minimum of machining.

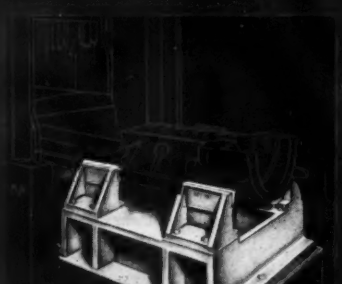
These new clutches and brakes have been tested out with good results on some designs of Bliss high-speed can machinery, new inclinable presses, and in many replacement clutch applications.

"A New Approach to Copy Turning," 28 min., color, sound, 16 mm, from The New Britain Machine Co., New Britain-Gridley Machine Div'n, South and East Sts., New Britain, Conn.

Swartz
SPECIAL FIXTURES
for
AUTOMATIC TRANSFER
and
INDEX MACHINES



Swartz fixtures were specified for the 4-station Rotary Index Machine shown in the above illustration. The result—dependable, on-the-job fixture performance!



Here is a typical Swartz fixture installation, on a multi-station Transfer Machine. Another example of how Swartz efficiently serves the builders of modern automatic machine tools.

...from PART PRINT to FINISHED FIXTURE!

To both buyer and builder of automatic machine tools, Swartz offers a specialized fixture-building service . . . complete in every detail, from part print to finished product. Swartz fixtures represent the accumulated experience and skill of more than 30 years in this highly specialized field, and the advantages of Swartz service have become increasingly important with the rapid growth of automation.

If you use or build automatic machines, you can profit from Swartz service. Assure yourself of continuous production, with a minimum of costly down-time! *You can,* with dependable Swartz fixtures! They are guaranteed. Call in a Swartz engineer, to discuss your fixture requirements. You'll be glad you did.

Swartz service is presented in a new brochure, "Advancing Automation", and a copy will be mailed on request.

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★ **CHAMFERING**

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for machine deburring and chamfering of line-drilled and otherwise inaccessible hole surfaces.

for the automatic deburring and chamfering of front and back hole faces simultaneously in sheet metal, etc.

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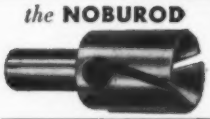

for rapid deburring and chamfering the outer ends of rods, tubes and bosses.

for rapid deburring and chamfering openly accessible hole faces.

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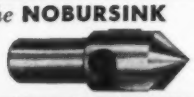

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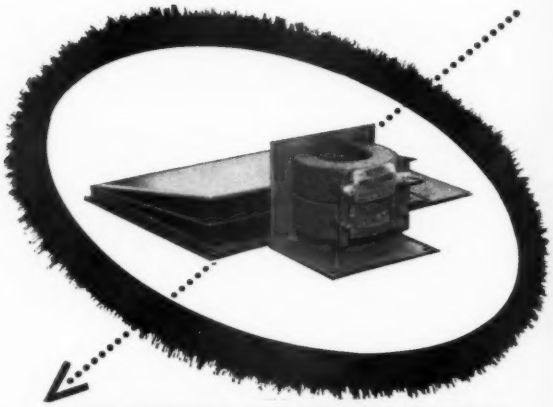

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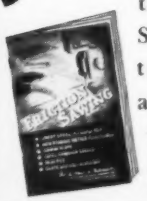

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BAILEY ELECTED PRESIDENT OF WARNER & SWASEY

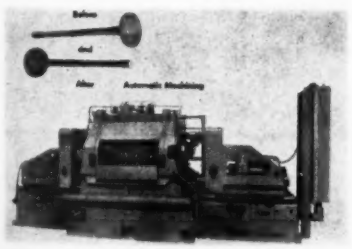
Walter K. Bailey, Vice President of Warner & Swasey Company since 1942, has been elected President of the well known machine tool company. Bailey succeeds Charles J. Stilwell who moves up to be Chairman of the Board.

Bailey, a native Clevelander, joined the Warner & Swasey organization in 1919 following his graduation from Oberlin College. Starting as a special apprentice, he became sales representative for the company in the Chicago area, advanced through various posts in the sales department, was made Sales Manager in 1939, and Vice President in Charge of Sales in 1942, when he was also elected a Director. In 1951 he became Vice President in Charge of Manufacturing.

He is a Director of the Rotor Tool Co., The Clark Controller Co., The Elwell Parker Co., and President and Director of the American Machine Tool Export Association. He is a Trustee of Oberlin College, The Cleveland Welfare Federation, and the Cleveland Community Chest.

BUHR MACHINES DRILL, FACE 147 SHAFTS AN HOUR

"Economy" and "automation" are the bi-words for three trunnion-type examples of Buhr "Economation" which are now each processing 147 rear-axle shafts an



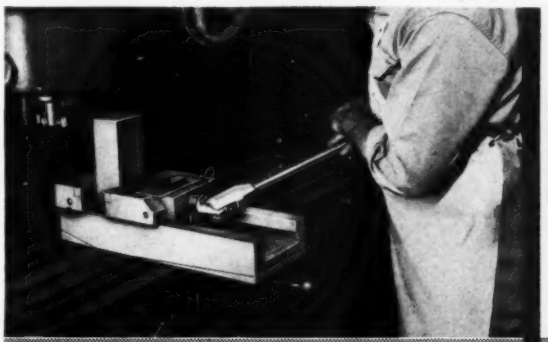
hour at 80 per cent efficiency, for a large automotive manufacturer.

Each of the two-way horizontal hydraulic-feed Buhr Specials center-drills both ends, drills two ½" diameter holes in the large end, and faces the small end of the axle shaft.

The machines have three-station single-place trunnion-type holding fixtures, arranged with automatic indexing and automatic clamping by means of two power wrenches which operate two self-centering chucks.

All machine parts are held to tolerances and are completely interchangeable and each component assembly is located by precision-bored dowels, assuring precision alignment.

Other features include electrically controlled automatic index of the cam-and-roller type to guarantee uniform acceleration and deceleration of the indexing movement, hardened-and-ground laminated tool steel ways which are automatically lubricated, and all multiple heads of Buhr ball-bearing construction with shaved gears and broached-and-splined drives.



LARGE CAPACITY
HALF THE WEIGHT
MULTIPLE CLAMPING POWER
FULLY ADJUSTABLE

New milling vise

the only swivel vise that mounts flat on table . . .

The New J & S CLAMPCUT Milling Vise multiplies the clamping and holding power expected of a milling machine vise. The powerful Acme threads tighten the adjustable jaw head and the patented down holding clamping jaws multiply the pressure.

Engineered and designed for full efficiency with a minimum of weight, nothing is wasted—no part is non-functional. Many times the holding power of an ordinary vise, yet only half the weight.

EASY TO USE
SNAPS TO WORK — then tightens
READILY DIS-ASSEMBLED
REVERSIBLE JAWS

A quick-release taper swivel provides positive clamping in position with only two "T" bolts. The swivel is calibrated for full 180°.

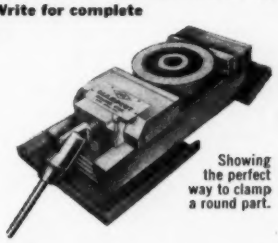
This fast loading vise is provided with exclusive "snap-on" parallels that cannot be clogged with chips.

Holds round pieces in vertical position and has adjustable stop for repeating operations quickly and accurately.

J & S CLAMPCUT Vises come in two sizes for 12" capacity and 8" capacity. Write for complete details and prices.

Quick finger release for setting and resetting any position for full range of vise.

Distributors in all industrial areas.



Showing the perfect way to clamp a round part.

WHEEL DRESSERS J&S TOOL CO. INC. JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES **CLAMPCUT** SINE BARS

J & S TOOL CO., INC.

880 DORSA AVE.
LIVINGSTON, NEW JERSEY

CIRCLE INFORM-A-GRAM KEY NO. 971

HOW TO GET ALONG WITH YOUR LATHE OPERATOR'S WIFE

Executives interested in pleasant labor relations would do well to talk to the wives of their employees. They would learn that a tired worker makes a grouchy husband; a grouchy husband, a discontented wife. And the effect of "family" trouble on your production can be a serious matter.

Operator fatigue resulting from repetitive manual movements can be quickly reduced in an almost unlimited number of jobs with Bellows "Controlled-Air-Power" Devices. These versatile, inexpensive, power units can perform almost any repetitive manual motion faster, safer and better than your most skilled workman. They feed work to tools, tools to work; open and close work holding devices; position and eject parts with speed and accuracy. They are easily installed on lathes, drill presses, tapping machines, milling machines, grinders, etc. They can form the "heart" of countless special purpose machines you can build in your own plant.

Not only will these versatile devices end "fatigue" problems in many of your operations, but they will enable any operator to produce more — at lower cost.

A suggestion

Ask your foremen what are the most tiring jobs in their departments. Then phone your local Bellows Field Engineer (he's listed in your phone book under The Bellows Co.). Ask him how Bellows "Controlled-Air-Power" can remove the fatigue from those tiring jobs.

Bulletin CL-50 (free on request) describes Bellows devices — and tells how they are used. Write: The Bellows Co., Dept. TP-655, Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., 14 Advance Road, Toronto.

The Bellows Co.

AKRON 9, OHIO

1222-A

CIRCLE INFORM-A-GRAM KEY NO. 981

MANUFACTURING MEMOS

For Larger Aircraft Forgings . . .

• The half-way mark in the Air Force Heavy Press Program was reached with the dedication last month of the Air Force Cleveland plant adjacent to the Cleveland Works of Aluminum Company of America, housing two giant hydraulic forging presses. The 50,000-ton and 35,000-ton presses in the 12-acre Cleveland plant, operated by Alcoa, produces heavy aircraft forgings, adding greatly to the production capacity of the nation's aircraft industry.

"Datamatic" Processing . . .

• Minneapolis Honeywell Regulator Co., with 70 years of experience in developing and building automatic control equipment, and Raytheon Manufacturing Co., prominent in the electronics industry, have joined forces in undertaking to engineer and market new, large high-speed electronic data-processing systems for use in business and government. Honeywell has a 60 percent interest in the new organization—Datamatic Corporation—and Raytheon, the remaining 40 percent. Datamatic Corp. will headquarter in Waltham, Mass.

Anniversary Greetings to . . .

• One of the pioneers of the metal cutting industry, Butterfield Division of the Union Twist Drill Co., is celebrating its Diamond Jubilee. Incidentally, the division's buildings, in Rock Island, Ont., and Derby Line, Vt., are divided by the International Border.

Honored Industrialists . . .

• The American Society for Quality Control has elected to Fellow Grade Henry J. Jacobson, quality control manager for Grand Sheet Metal Products Co., Melrose Park, Ill. His wife, Dr. Marjorie L. Sutherland, also a Fellow of the Society, is president-elect of the Chicago Section, A.S.Q.C.

• President-elect of the Scientific Apparatus Makers Association is Henry F. Dever, president of Brown Instruments Division, Minneapolis-Honeywell Regulator Co.

• Three engineer-executives "who have made important contributions to the science of industrial heating and to its application in national defense" were recipients last month of the industry's top honor, the Trinks Industrial Heating award. They are: Horace Drever, president of Drever Co., C. E. Hawke, vice president of The Carborundum Co., and Walter H. Holcroft, executive vice president and technical director of Holcroft & Co.

The Garrett Corporation, Los Angeles, is now engaged in a program of modernization and further expansion of its plants and facilities, and it is estimated that this program will amount to about $5-million over the next two years.

◆

The Die Supply Company, acquired by E. W. Bliss Company in 1953, is now known as the Die Supply Division of Bliss. The division will continue to market Dieco die sets, Dieco die springs, and a full line of other die makers' supplies.

◆

The Producto Machine Company, in conjunction with the Bossert Company of Kansas City, Mo., is now operating an assembly warehouse in that city to provide faster die service for Missouri, Kansas, Nebraska, Colorado, Oklahoma, Arizona, Texas, New Mexico, and Utah.

◆

Electrolytic shaping, only recently emerged from the laboratory stages, has been responsible for drastic reductions in the cost of grinding and working with such hard-to-grind materials as the carbides, titanium, alloy steels, and the new "honeycomb" materials recently introduced to the aircraft industry. Newly-formed Anocut Engineering Company, Chicago, has been engaged in the development and manufacture of equipment for the automatic electronic control of electrolytic shaping systems since the beginning of the year.

◆

Dalton Gear Company, Minneapolis manufacturer of all sizes of gears from microscopic size to 36" diameter, has been purchased by J. K. Weiser, Minneapolis, and the Minnesota Bearing Company, headed by Mr. Weiser, has been named representative of the firm.

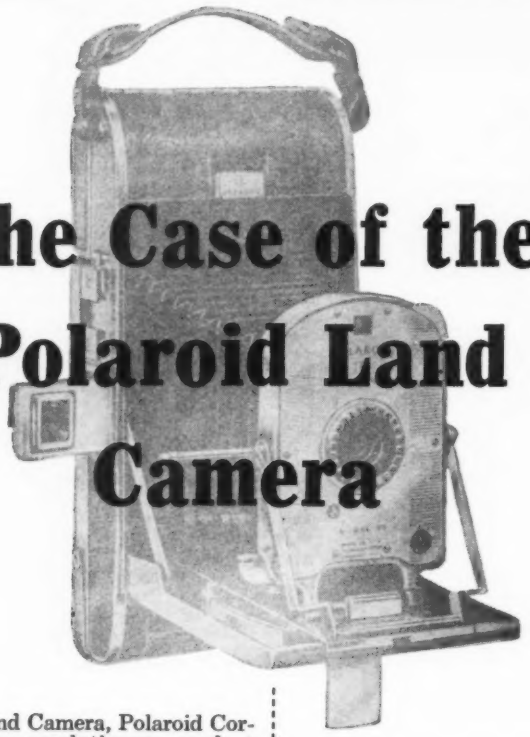
◆

Borg-Warner Limited, a newly-created subsidiary of Borg-Warner Corporation, is building a multi-million dollar plant at Letchworth, England, to produce automatic transmissions, semi-automatic overdrives, and other component parts for the British automotive industry.

◆

The name of The Alpha Corporation has been changed to The Alpha Molykote Corporation, reflecting the primary activity of the company, which is the development, manufacture, and sale of industrial lubricants known under the trade name "Molykote."

STAMPINGS IN SMALL LOTS



The Case of the Polaroid Land Camera

In the first Land Camera, Polaroid Corporation had a revolutionary product that took a picture, and 60 seconds later turned out a finished print. Before tooling up for mass production, it had to answer two questions. What is the sales potential? And, will the camera operate perfectly in the hands of the public? Polaroid decided to test the market with a pilot run of 1,000 cameras.

The product engineer, well aware of the value and low cost of short run stampings for such pilot runs, came to Dayton Rogers Manufacturing Company for help. As a result, all die-cut stampings for the first thousand Land Cameras were supplied by Dayton Rogers.

Polaroid was able to test its now famous camera and make changes for a fraction of the price of conventional tooling.

FREE . . . We will gladly send you a booklet describing in detail how Dayton Rogers can take you economically through periods of product development and product change. Please write for it on your letterhead.

LOW-COST WAY TO TEST NEW PRODUCTS

Dayton Rogers Manufacturing Company produces metal stampings in small lots with rigid accuracy and remarkable economy. *The short-run tools cost you no more than 15% to 20% of conventional type tooling.* Here is truly the low-cost way to develop new products and to make improvements or changes in existing products.

This method was originated by Dayton Rogers more than 30 years ago. It is based on a patented process, special machinery and craftsmen specially trained as short run tool makers. No other method equals it. All over the country manufacturers are using Dayton Rogers metal stampings for product research and experimental runs.

Factory-trained representatives in all principal industrial areas

NATIONAL HEADQUARTERS FOR METAL STAMPINGS IN SMALL LOTS

DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 1001

"Commendable Comments"

"Ford is proud of the progress it has made in the field of automation . . . our employment has increased almost 50% since we started modernization of our plants . . . our product is subject to too frequent changes to justify extensive automation . . . fewer than 5% of 136,000 hourly-rated employees currently work on automated jobs."

—From an address by Ernest R. Breech, chairman of the board of Ford Motor Co., before the New York Financial Writers Association.

"Automation is an economic necessity for America during the next 25 years and must be adopted at every opportunity because of the more educated and mature populace which will come into existence in that time. It is psychologically necessary."

—Message by Milton O. Cross, Jr., president of The Cross Company. New England Congress of the National Metal Trades Association.

"The fastest growing cost in modern manufacturing is the cost of plant maintenance. U. S. industry this year will lay out almost $14 billion in total maintenance costs . . . many experts believe that the rapid acceleration of automation in industry will mean that today's maintenance spending will be doubled within 10 years."

—R. J. Meidel, president, California Manufacturers Association and president of United Can and Glass Co.

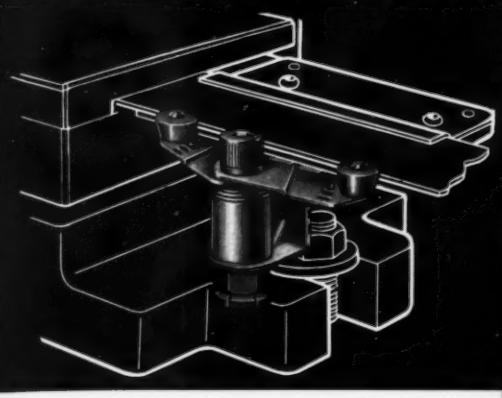
"Automation is the automatic performance of a control system by mechanization instead of human force — the base for all is the machine, however it will never replace judgment. A new labor problem will arise and with it the demand for more highly trained men . . unemployment due to automation has not occurred, but the effect of automation on labor must be carefully considered."

—Mr. Bernard Eichwald, of B. Eichwald & Co., Inc., Phoenix, Arizona. Seminar Young Presidents Organization.

"We must take advantage of modern equipment to keep abreast of the game. We must not return to the system of moving materials on human backs, or by shovel and wheelbarrow. Industry will need increasingly larger numbers of men trained in hydraulics, machine tool building, and electronics — specialized craftsmen of all kinds who can service and operate large complicated batteries of machines."

—Del S. Harder, executive vice president Ford Motor Co. Safety Conference of the Akron Chamber of Commerce.

NOW...
A Low-Cost Stock Guide



NEW DANLY ROLLER STOCK GUIDES AND GUIDE RAILS

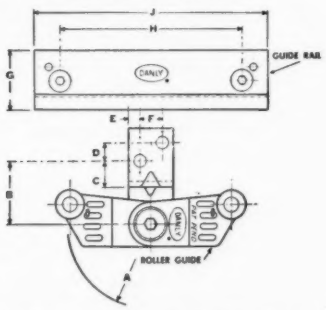
READY MADE—QUICK TO INSTALL

Versatile...for use on dies or in any operation where coil or strip stock must be guided.

Low-cost...the cost is only a fraction of the shop expense necessary to tailormake a guide.

Rugged...constructed entirely of steel. Rollers, arms, collar and bracket are hardened. Adjustable, three-coil music wire spring.

Roller Guide, Large.....$4.50 each
Roller Guide, Small.....4.00 each
Guide Rail.....$3.50 box of five (all one size)
(Discount for quantity orders)



Roller Guide Dimensions, Inches

	Cat. No.	A	B	C	D	E	F
Roller Guide Large	9-70-6	2 3/64	1 15/32	5/8	1/4	5/16	7/16
Roller Guide Small	9-60-6	1 27/64	1 1/16	7/16	5/16	5/16	3/8

Danly Roller Stock Guides packed one to a box unassembled, furnished with light or heavy-duty spring for optional use plus all necessary mounting screws and mounting instructions.

Guide Rail Dimensions, Inches

	Cat. No.	Max. Stock Thickness	G	H	J
Guide Rail	9-8025-6	.025	1	3 1/8	4
	9-8045-6	.045	1	3 1/8	4
	9-8080-6	.080	1	3 1/8	4
	9-8125-6	.125	1	3 1/8	4

Danly Guide Rails packed five of one size per box, furnished with mounting screws and dowel pins.

For immediate delivery, specify catalog number and mail orders to

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue • Chicago 50, Illinois

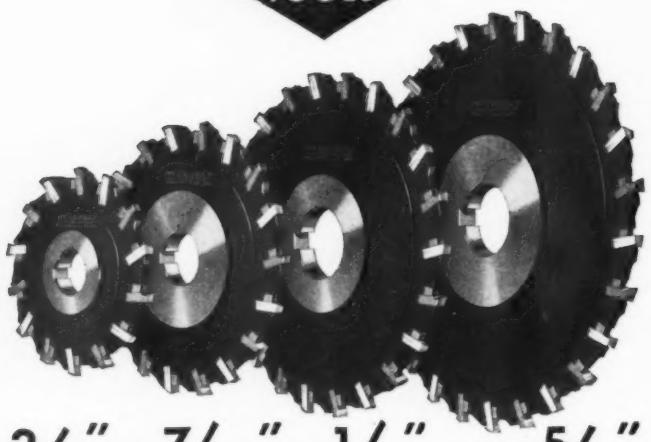
CIRCLE INFORM-A-GRAM KEY NO. 1011

MORE
machine builders now specify
WEDIN
LEAD SCREWS
The print you send us for quotation—any quantity from one screw and up—will receive our immediate attention. Or if you prefer, drop us a card and our representative will call.
they're GROUND to stay accurate LONGER
serving industry for 18 years
WEDIN CORP
WEDIN CORPORATION
1221 E. Nine Mile Rd., Detroit 20, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1012

McCROSKY

COST CUTTING TOOLS



3/8" - 7/16" - 1/2" and 5/8"

THIN SLOTTING CUTTERS

4" — 5" — 6" — 8" — 10" and 12" in diameter

with Jack-Lock® blade locking wedges

• Developed by McCrosky, these new cutters combine the rigidity of solid slotters with the greater economy — longer life — the easy, positive locking of each blade — and the quick release and accurate blade adjustment of McCrosky's shop-proved Jack-Lock Wedge. Locking pressure of the wedges against the alternate right and left hand milled and ground blades is parallel to the sides of the cutter, avoiding any side stress, warping or misalignment. Easily converted into half side cutters by simply inserting blades all of one hand. New bulletin gives dimensions and full details. *Write for Bulletin 17-M today.*

COST CUTTING TOOLS McCROSKY TOOL CORPORATION MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

Jack-Lock®
MILLING CUTTERS
Face Mills, Shank and Shell End Mills, Half Side and Staggered Tooth Cutters. Sizes to 24" in dia.
Super®-Adjustable
REAMERS
Chucking and shell designs. Proven construction locks blades rigidly, producing smooth, concentric holes.
Special
PRODUCTION TOOLS
Combine 2 or more related operations into a single tool, producing better products, quicker, and cheaper.
Universal
MILLING CUTTERS
Bodies can rotate in either direction. Simply using blades of proper hand, angle and cutting material, meets any requirement.
ask us about...
Wizard®
QUICK CHANGE CHUCKS
Tools are held centered and rigid. Operator can change tools without stopping or slowing down the spindle, increasing production and cutting costs.
Turret
TOOL POSTS
Successive tools are swung into cutting position quickly, indexed accurately and locked rigidly, giving engine lathes the versatility of turret lathes. 5 styles, 9 sizes.
Block Type
BORING BARS
Bore more pieces in shorter time, with greater accuracy. Stock sizes with straight or tapered shanks, with or without pilots, for holes up to 15" in dia.

CIRCLE INFORM-A-GRAM KEY NO. 1021

Oxygen Contour Cutting Machine

Mechanization does build jobs for men.

Proof of this, so far as the Bos-Hatten, Inc., is concerned, lies in their own experience.

Bos-Hatten is a plate and alloy jobbing shop noted for their precision fabrication. If there is any way to mechanize an operation, they do it. From 1945 to 1953, their already substantial sales increased 288% with a 78% increase in personnel.

Chief amongst the mechanization procedures employed by Bos-Hatten are recently developed oxygen cutting techniques brought out by the Heath Engineering Company. Their line of Ultra-Graph oxygen cutting machines embody many new features not found in other contour cutting machines.

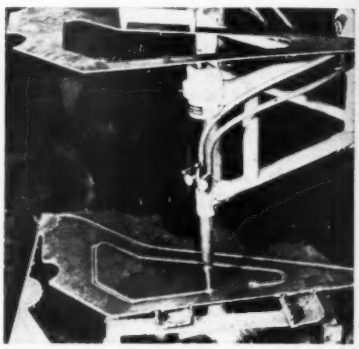


Fig. 1. Plate being cut by Ultra-Graph is tack welded at front end only. No distortion is experienced in cutting. Note that the tracing head is in the same center-line as the torch — in fact, precisely in the same center-line as the cutting orifice in the torch.

The largest of the machines in regular production cuts a 72" straight line; a 38" circle and an 84" semi-circle. The smallest one cuts a 60" straight line; a 29" circle and a 70" semi-circle. A machine now under construction at Heath Engineering will cut a 114" straight line; a 142" semi-circle and a 66" circle. Cutting speeds are very high and for tracing purposes certain models will reach speeds as high as 56 in./min. for special applications and welding.

Several new engineering features have contributed to the remarkable savings in price. Most contour cutting machines have used heavy electro-magnets on

the tracing heads, which in turn made it necessary to construct arms supporting the tracing head and torch tip of heavy metal.

The Ultra-Graph uses a light-weight Alnico permanent magnet which exerts a force of from 3 to 12 lbs against the template. The cost saving in the permanent magnet is in excess of $300 alone, and the resultant construction of supporting arms of light-weight, thin-walled tubing, supported on sealed bearings, contributed even more to the over-all savings.

Fig. 2. Stack of 25 pieces of 10 gauge metal being cut to contour by Ultra-Graph oxygen cutting machine. Total time for cutting to rough shape on shear, stacking and compressing in hydraulic press, tack welding and contour cutting — 15 minutes.

Accuracy has been insured by mounting the template follower in the same center-line as the cutting orifice in the torch head.

Standard machine torches used in the Ultra-Graph vary from 8″ to 16″ in over-all length and a vertical adjustment of the torch tip up to 4″ is possible. The balance of the cutting and tracing arms is precise and there is no distortion in cutting operations.

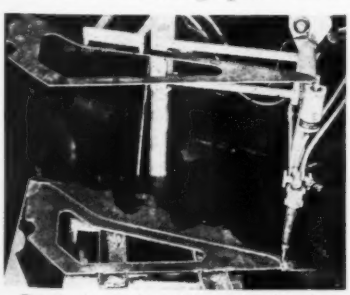


Fig. 3. Producing this engine bracket formerly required 13 separate operations. The Ultra-Graph oxygen cutting machine reduces the 13 operations to 2 and produces fast clean cuts to very close tolerances.

prolong tool life • cut finishing costs with* LIQUAMATTE® *wet blasting

Burrs, fuzz and feather edges spell trouble for tools. Liquamatte wet blasting removes these impediments quickly and thoroughly. Loading and build-up are eliminated. Tool edges are sharp and well-defined, and cutting tools stay sharper longer.

Liquamatte finishing also provides a better surface for plating. With all feather edges removed, there are no burrs to break off and thus remove the plating from the cutting edge. Blasting after plating imparts a fine matte surface over which lubricant and materials flow easily, improving performance and life of the tools.

Liquamatte wet blasting is fast, too. One tool manufacturer now finishes 5 to 6 drills in the time formerly needed to wire brush only one. Less time — less cost.

Field-designed and tested, the simplified Liquamatte cuts time and costs in an almost unlimited number of applications. A new 16-page brochure, packed with pictures, drawings and fact-filled copy, tells of 40 cleaning and finishing operations in which Liquamatte wet blasting cuts costs. The machine, its components and principles of operation also explained in detail.

You will find much valuable information in this new brochure. Send for Brochure No. 451-D.

American WHEELABRATOR®

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 852 S. Byrkit St., Mishawaka, Ind.

CIRCLE INFORM-A-GRAM KEY NO. 1031

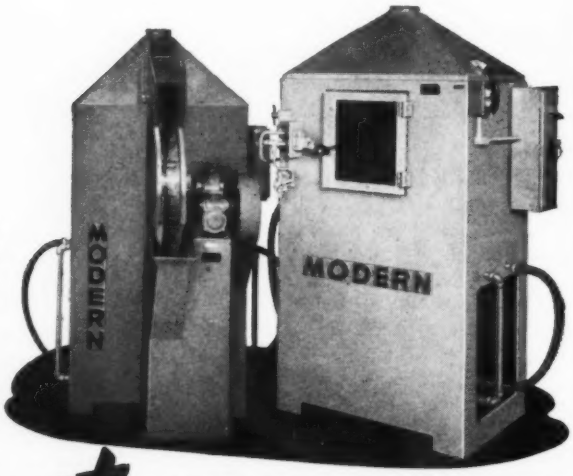
VENDOR HOBS SUBJECT TO QUALITY CONTROL

Quality Control of components received from vendors has become a growing practice in industry with some variations in the methods used.

However, we wouldn't expect to see hob checking equipment in use daily in a supervisory office, but Warner Gear Division, Borg-Warner Corporation, places such a high premium on hob accuracy in order to produce quality gears that three Michigan Sine-Line machines are "office equipment" next to the desk of Harry Gindhart, gear methods supervisor. As hobs are furnished by various suppliers, they are checked upon arrival to see if they meet the specified standards. These machines are used by their methods engineers and are separate from their regular checking equipment.

A methods engineer is shown checking the lead on a gear hob on a Sine-Line 876 hob lead checker equipped with automatic recorder. A model 471 hob sharpening checker is at the left. Also in the office but not shown in photo is a Sine-Line 464 hob contour checker.

Photo courtesy Michigan Tool Co.



Larger parts are deburred in Maizo Blast machine (right) with stationary fixture. Operation is automatic when door is closed. Small parts are deburred in model with continuously rotating ferris-wheel type fixture (left).

Blast THOSE BURRS! with Modern Maizo Blast

If you're being plagued with light burrs on high-production metal parts, get Modern Maizo Blast equipment and forget them.

Simply load the parts into a continuously rotating fixture if they're small—larger parts are placed on a stationary fixture in a door-operated model. The rest is automatic. A blast of high-pressure air containing ground maize or walnut shells quickly whisks off burrs.

Proper blasting material enables you to deburr without pitting finished surfaces.

Outstanding performance and quality are notable features of Maizo Blast equipment. That's because it's made by the maker of the famous Burr-Masters, the fastest production gear burring and chamfering machines available. Modern has put the same "know-how" into the Maizo Blast design to give the utmost in operating efficiency.

Write today for Bulletin 103-57 covering Maizo Blast equipment for both small and larger parts.

MODERN Industrial Engineering Co.
14230 RIVERWOOD AVE. DETROIT 4, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1041

"AUTOMATION" BELTS AT MATERIALS HANDLING SHOW

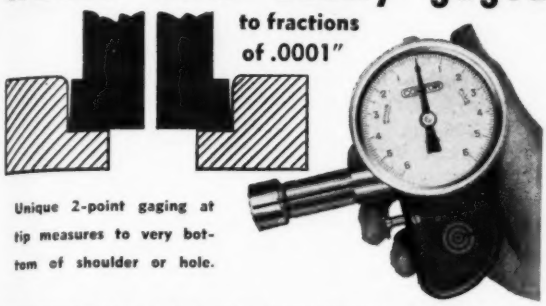
A line of "Automation" conveyor belts, designed to meet the needs of new manufacturing concepts in all industries, has been developed by The B. F. Goodrich Company Industrial Products Division. Four new belt constructions were shown at the National Materials Handling Exposition in Chicago, May 16-20.

The new automation line features a tan Koroseal belt which has excellent resistance to abrasion, oils, grease and most acids. It is made of the same tough, flexible material used in manufacturing Koroseal garden hose and bus upholstery. Koroseal belts have a smooth, easy-cleaning, non-porous surface that resists flaking or checking and eliminates the danger of contamination of materials handled.

Other new belts in the "Automation" line include "Highseal," "Cariall," and "Economy." A new scientifically tested "eye-rest" green color distinguishes

. . . *Continued on page 109*

COUNTERBORES and BLIND HOLES now easily gaged



to fractions of .0001"

Unique 2-point gaging at tip measures to very bottom of shoulder or hole.

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8" to 8" dia.

Unique Advantages

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging—automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable—no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

COMTOR COMPANY
82 Farwell St.
WALTHAM 54, MASS.

GET THE FACTS — REQUEST BULLETIN 48

CIRCLE INFORM-A-GRAM KEY NO. 1051

Announcing "ADJUSTABLE-STROKE" MIDGET Air-Clamp* CYLINDERS

*TRADE MARK

Actual overall length horizontal models: 3½", 5", 6".

New! —SAVE TIME!

These 6 brand-new Midget Air Clamp cylinders with adjustable strokes variable from ½" to 3" can be used where longer strokes are needed *and* stroke can be "tuned" to exact length wanted even *after* setup is made!

New! —SAVE AIR!

You can save air in large fixtures where dozens or hundreds of "Midgets" are used by adjusting stroke with special spanner wrench furnished with cylinder.

New! —SAVE SPACE & MONEY!

The "nose" on each "Midget" also telescopes into barrel reducing stroke and overall length to save space in cramped quarters! Each Mead "Midget" is guaranteed to give you millions of trouble-free cycles—to be a better value, dollar for dollar, than any comparable cylinder. Priced so low you can almost forget it!

Actual overall height vertical models: 3 9/32", 4 23/32", 5 25/32"

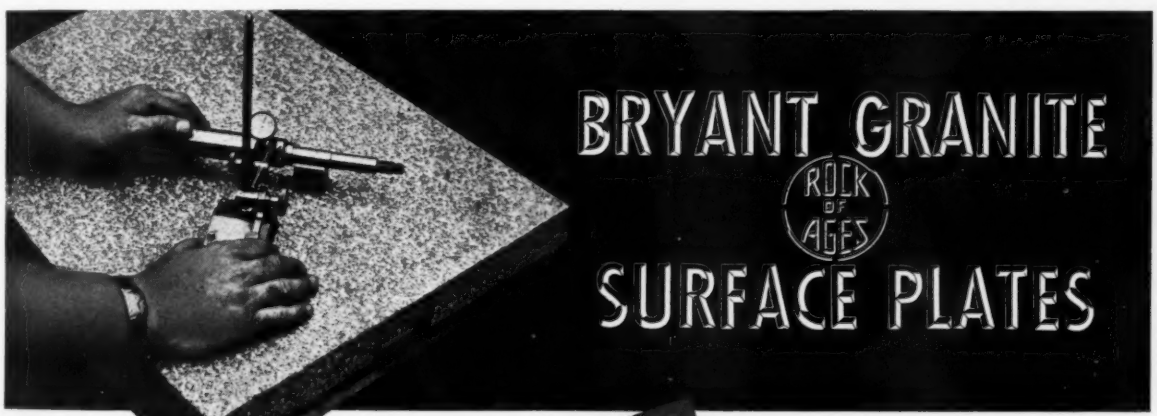
"MORE per hour with Mead Air Power"

Write Factory or Nearest Mead Man For Bulletin HA-65 (See Index Thomas' Register for address, phone).

PATHFINDER IN AIR POWER AUTOMATION

MEAD
SPECIALTIES COMPANY
4114 N. Knox Ave., DEPT. HA-65
CHICAGO 41, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1052



Finest Stone and Expert Workmanship Assure Utmost Precision

Every Bryant Granite Surface Plate is doubly guaranteed — by Bryant, maker of precision machine tools and gaging equipment, and by the world-famous Rock of Ages quarry.

Bryant *unconditionally* guarantees every plate for flatness and accuracy. Rock of Ages guarantees the granite itself, in regard to perfect grain, close-knit composition and flawless texture.

Every plate is finished on the head of the grain, a patented process . . . and manufactured by skilled, painstaking Vermont craftsmen.

Bryant surface plates offer you the means of utmost precision in your layout, inspection and assembly work . . . plus maintenance-free qualities and enduring accuracy at low initial cost.

BRYANT CHUCKING GRINDER CO., Springfield, Vt., U. S. A.

Internal Grinders • Boring Machines
Internal & External Thread Gages • Granite Surface Plates

Mail coupon for complete details!

BRYANT CHUCKING GRINDER CO.
Springfield, Vermont

Gentlemen:

Please send me your free folder describing Bryant Granite Surface Plates.

Name _____ *Title* _____

Company _____

Street _____

City _____ *Zone* _____ *State* _____

TP

CIRCLE INFORM-A-GRAM KEY NO. 1053

STEREOMICROSCOPES BRING 3-D TO THE ASSEMBLY LINE

Stereomicroscopes are playing an increasing role in the manufacture and inspection of instruments, electronic components, and various other products that require high precision or purity . . . according to the Bausch & Lomb Optical Co. of Rochester, N. Y., a leading producer of these 3-D instruments.

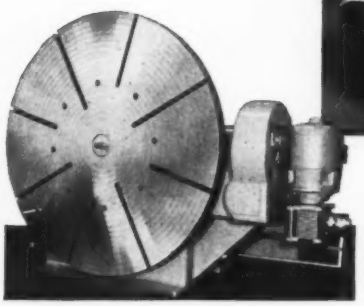
In a wide range of manufacturing plants, stereomicroscopes are detecting flaws and impurities, ensuring precise fitting of small delicate parts, and in general helping workers do high precision work with a minimum of the training previously required. Because of the reduction in eye strain, some plants have observed a definite upswing in employee relations when the instruments were adopted.

In one installation at the Fairchild Camera & Instrument Corp. of Hicksville, Long Island, stereomicroscopes permit operators to accurately assemble potentiometers of ½" dia. and containing 35 parts. Because the potentiometer is a critical sensing element in the control system of guided missiles, precision manufacture is vital.

Telephone relay manufactured by the Stromberg Carlson Corp. of Rochester, N. Y., is adjusted to precise setting required with the aid of a Bausch & Lomb stereomicroscope.

Magnification produced by stereomicroscopes ranges from 6 to 150 diameters, depending on specific working requirements.

Industry's First High-Precision Universal Inspection Table



The New **ROTAB**

ROTAB now gives you fast, accurate checking of complex shapes at a minimum investment in fixtures:

1. **Microscopic Precision**—Direct reading to 5 seconds.
2. **Faster Multiple Inspection**—Simple inspection operations provide closer quality control on radial and angular checking.
3. **Finger-Tip Operation**—Quick acting, positive controls for table tilt and rotation.
4. **Easy Reading**—Checking and measuring planes conveniently positioned.
5. **Four Standard Sizes**—Select the model best suited to your jobs. Face plate diameters available are 12", 24", 36" and 48".

Write for the complete **ROTAB** *story.*

MACHINE PRODUCTS CORP.
6771 East McNichols Rd. Detroit 12, Mich.
Dept. C

CIRCLE INFORM-A-GRAM KEY NO. 1061

AUTOMATIC PROTECTIVE PACKAGING

During the past decade, protective packaging of industrial goods has become more scientific and exacting than ever before.

The trend in industrial packaging has been towards use of high-speed automatic packaging machines to seal small parts in individual envelopes with speed and efficiency unattainable with time-consuming hand-sealing. To protect against spoilage due to wide temperature ranges and variations in humidity, and to reduce spiraling packaging costs, manufacturers are turning to automatic packaging machines to package small products like O-Rings and seals in individual paper pouches.

An example of such a machine is the Pak-O-Mat, used by Stillman Rubber Co., to seal O-Rings in printed envelopes to government specifications. One

of the nation's leading producers of O-Rings and other rubber products, Stillman uses the Pak-O-Mat to print part and contract number, along with other pertinent information, on the O-Ring package.

The Pak-O-Mat, manufactured by Product Packaging Engineering, has many unique features which make it one of the most desirable automatic packaging machines of its type available. Chief advantages include the ease with which the rollers can be changed, a unique cam design which makes possible quick adjustment of timing for size of O-Ring, and automatic feed and cutoff equipment. Product Packaging Engineering also supplies the machine to aircraft manufacturers who use it to package small parts.

Magnesium-Thorium alloy HK31 sheet and plate is now being rolled by Brooks & Perkins, Inc. of Detroit. The thorium alloys of magnesium were formerly available only as castings. They have excellent tensile strength and creep resistant properties in the 300° to 700° F. temperature range. In this regard, they are superior to the alloys of aluminum and to any of the other magnesium alloys. Alloy HK31 is particularly useful for jet engine and missile applications.

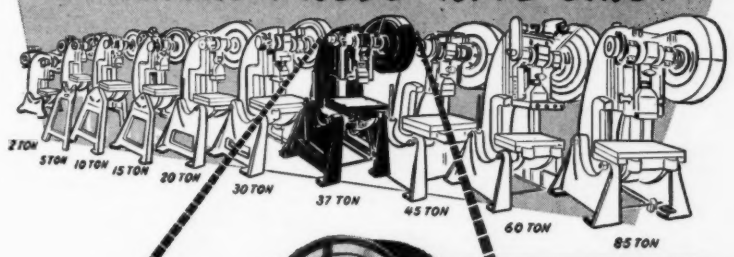
The Pak-O-Mat feeds O-Rings from a hopper down a chute to a vibrating feeder and deposits them on a web of polyethylene-coated kraft paper. Another web of sealing material, printed with specification number and other data required by military orders, joins the bottom web at the sealing rollers where pouches are heat-sealed and precisely cut by a cutting knife. Speed is 6,500 O-Rings per hour.

A timing pin that accommodates O-Rings from ½" to 6½" in diameter allows only one O-Ring at a time to drop onto the moving web of sealing material. An electric pre-determining counter stops the machine automatically when the pre-set count is reached. An additional counter gives immediate tallies.

The web of kraft which forms the top surface of the envelope is printed by a rubber printing plate which may be easily changed between runs. A chain-and-sprocket drive keeps the machine in synchronization, and a U. S. Vari-Drive gear unit permits infinite speed adjustments.

THERE'S SOMETHING NEW IN THE

Famous PRESS-RITE Line



37 TON
OPEN BACK • INCLINABLE
POWER PRESS

Brand New! . . . with the latest advanced Press-Rite "long-life" features for hard, 'round-the-clock production . . . rugged 3¼" crankshaft, full Vee ramways, extra-heavy ram slides, heavy-duty bearings, Anti Friction roller bearings in Flywheel . . . built-in safety single stroke mechanism . . . automatic brake . . . increased Die Life . . . rugged, specially designed high-strength alloy frames and heavy reinforcing ribs eliminate die-wearing deflection even under the maximum capacity.

Long Life, Minimum Maintenance . . . Ruggedly built for years of hard, dependable, record-breaking service. PRESS-RITE's many exclusive long-life features make it today's top value.

Send for Catalog Today . . . for money-saving facts on the Press-Rite Line. Speed production and cut costs in your plant.

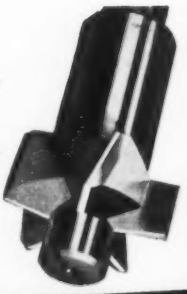
SALES SERVICE MACHINE TOOL CO.
2351 University Ave., St. Paul W14 Minnesota

PRESS-RITE

OPEN BACK • INCLINABLE *Power Presses*

CIRCLE INFORM-A-GRAM KEY NO. 1071

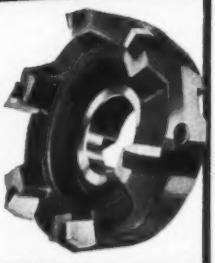
Standard interchangeable counterbores in *economy*, *quick-change* and *heavy-duty* types for all counterboring, spotfacing and countersinking. Also back-spotfacers, core drills, carbide-tipped counterbores.



Standard block-type boring tools for production rough boring, semi-finishing and reaming consist of standard blocks with adjustable, highspeed steel or carbide-tipped blades, rigid in slotted bars, yet quickly changed.

TOOLING – Standard and Special

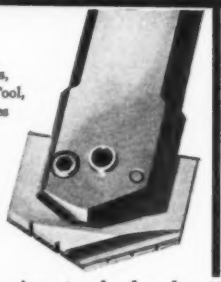
Gairing *E-Con-O-Mill* standard milling cutters save on inventory and grinding. Finish-ground blades fit cutter bodies of all sizes. Series 2500 cutters 5"—16" dia. and blades carried in stock.



Chip-Hog heavy duty turning tools allow top feeds & speeds on any machine. Pre-formed carbides, held rigid, adjustable two ways, save on grinding. Heat treated alloy steel shanks, in 3 styles, outlast many brazed tools.

by GAIRING TOOL – Detroit

Conner-type spade drills, now made by Gairing Tool, drill large and deep holes from the solid, in one operation. 256 cutter sizes, 1-¼" to 5" diameter, are interchangeable in 8 sizes of holders.



This tool, performing boring, hollow milling, facing and chamfering, is an example of the wide variety of the special tooling which is a major part of our business. May we solve your tooling problems?

When buying standard end-cutting tools, it's good economy to standardize on Gairing. For special tooling also, look to Gairing to design and make the tools that cut the costs • Write for our catalog and for the name of the nearest Gairing representative.

The GAIRING Tool Company

21227 HOOVER ROAD • DETROIT 32, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1081

NEW!

UNIQUE "Hole-True" COLLET ARBOR*

FOR PRECISION TURNING

Absolutely Concentric and "Square" to Bore!

For Toolroom and Production use

FEATURES:

1) **FAST SET-UP TIME**—Connects to drawbar exactly as a collet. No additional parts needed.

2) **SAVES LOADING TIME**—No stopping when used with production collet attachment...*thus increasing production up to 300%* over ordinary stop-load-start methods.

3) **PRECISELY HELD SHOULDER** distances even though bores vary. Work position does not change as arbor expands or contracts.

4) **ENABLES 100% FINISHING** operation on "length" of part and face.

5) **FOR ANY COLLET DEVICE**—on turret lathes, engine lathes, millers, grinders, etc.

Available in sets consisting of Master Collet Arbor and 3 Adapters to hold in bores of ⅜", ½", ⅝" and 1". Other sizes to order. NOTE: Current production to fit in place of 5C collet only. *Patent Pending

Write for descriptive bulletin.

The medelton CO., INC.
Dept. TPG
335 E. 142nd St. • Bronx 54, N. Y.

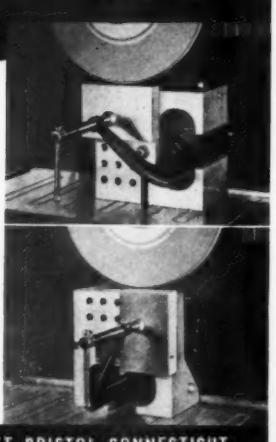
CIRCLE INFORM-A-GRAM KEY NO. 1082

NEW Federal Square Master ANGLE PLATE

Will Grind A Work Piece Square The Easy Way Without Skilled Help

Designed for grinding a work piece to exact squareness, whether it be a component of a jig, fixture, gauge, or die; eliminating an indicator, precision square, surface plate, and use of top skilled help on routine jobs. Can also be used on layout work and inspection. This precision tool is built of high grade steel, stabilized, hardened and ground. ALL WORKING SURFACES ARE GUARANTEED TO BE SQUARE within two-tenths of a thousandth . . . (.0002). Write for complete literature describing other outstanding features.

Note adjustable set edge and recess for C-clamp.



FEDERAL MACHINE TOOL COMPANY, EMMETT STREET, BRISTOL, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 1083

WRITE, WIRE or PHONE FOR YOUR CATALOG *Today*

BOLTS & CAP SCREWS
SOCKET, SET & CAP
NUTS, WASHERS
MACHINE SCREWS
SHEET METAL SCREWS
WOOD SCREWS
PIPE FITTINGS

Star Stainless screws have clean—bright and—shiny—heads

STAR STAINLESS SCREW CO.

CORROSION RESISTANT

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CIRCLE INFORM-A-GRAM KEY NO. 1084

. . . Automation, from page 104

"Highseal" from other belts designed for light industrial use. The belt's pleasing shade of green increases inspection efficiency by reducing glare and eye strain. Special belt surface makes it easy to clean.

"Cariall" is an all-purpose black automation belt. It has a tough oilproof rubber cover which will handle the majority of light weight industrial conveyor applications. The "Economy" belt, also black in color, is designed for low cost operation and to reduce maintenance problems caused by excessive changes in belt length.

Radial Arm Bench Router

A fast, practical method for accurate production routing work is found in the Onsrud Model W-106A radial arm bench router. Typical applications for this router include edge trimming and cut out operations on plywood, plastic and aluminum alloy sheets.

Maximum reach of the arm is to any point on a table in a radius of 44" from center of column.

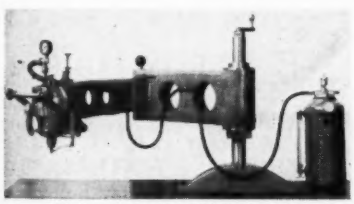
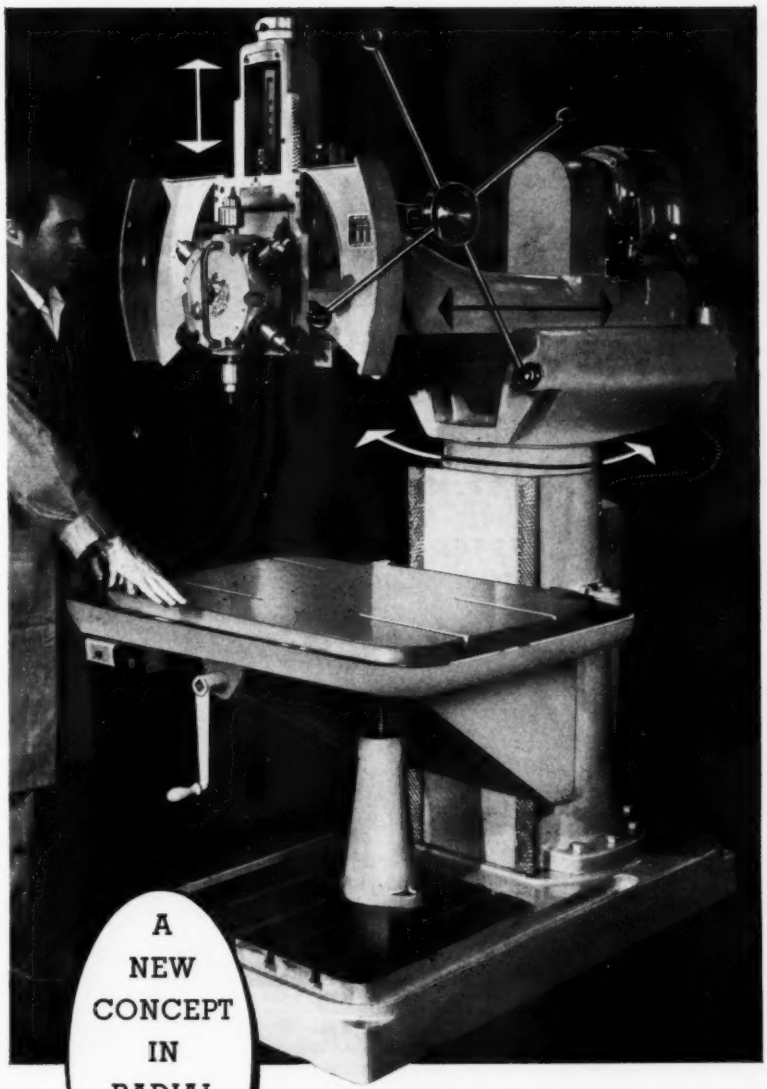


Photo courtesy Onsrud Machine Works, Inc.

The router is built with Onsrud pneumatic motors in capacities of: 1 hp @ 22,000 rpm and ¾ hp @ 30,000 rpm.

It is equipped with a Norgren lubrication tank, hose and fittings. Use of a coolant such as Cimcool is recommended when cutting aluminum. This will increase the life of the router bit and give a smoother cut in all grades of aluminum. This is especially true in soft aluminum which has a tendency to build up on a router bit when a coolant is not used.

The router is normally mounted directly to a table or bench top, where three bolts hold the router securely in place. Weight of the unit is 200 lbs.



A NEW CONCEPT IN RADIAL DRILLS

The BURGMASTER® 6-Spindle Turret-Type Radial Drill with POWER INDEXING

The 2BR BURGMASTER radial drill greatly increases production on bulky pieces. All tools, for a series of operations, are mounted in the spindles and quickly index into position. This Radial Drill *eliminates* the quick change tool and increases accuracy. The operator simply brings the spindle into position over the work, releases the pressure on the ram movement bar to lock ram and column, then is ready to quickly drill, tap, etc., thereby saving repositioning several times over a particular position.

THIS UNIT FEATURES:

Six spindles; pre-selective spindle speeds (225-3000 r.p.m.); pre-selective depth control for each spindle; 8" stroke; power indexing; hydraulic clamping; 2 h.p. motor; ¾" drill capacity in steel; maximum radius of 42"; minimum radius 15"; table size 36" x 24".

VISIT OUR BOOTH 716
METAL WORKING MACHINERY AND EQUIPMENT EXPOSITION
COLISEUM, CHICAGO, SEPT. 6-17

Write Dept. TP-6 for information

BURG TOOL MANUFACTURING COMPANY, INC. 15001 S. Figueroa, Gardena, Calif.

INCREASES PRODUCTION • IMPROVES QUALITY • CUTS COSTS

CIRCLE INFORM-A-GRAM KEY NO. 1091

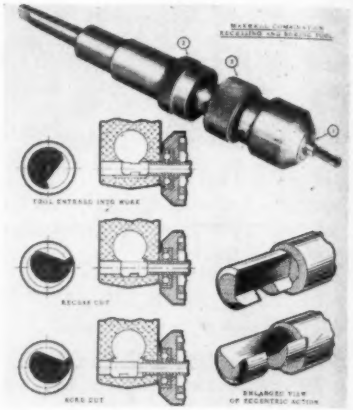
RECESSING, BORING CUTS COMBINED WITH NEW TOOL

Recessing and boring cuts are made simultaneously with Maxwell's ingenious new combination recessing and boring tool.

Pilot of the tool is entered into work until it comes in contact with its anti-friction stop on the nose of the tool. As the holder continues to feed toward the work, the body assembly moves forward until the adjustable stop nut controlling the diameter of the recess comes into contact with the boring unit retaining ring. This causes the eccentric cutter to rotate, producing a recess cut of any required diameter.

When the recessing cutter reaches the required diameter, the more powerful spring in the boring unit compresses, allowing cutting edges to move forward to complete the operation. Diameter of the bore cut is regulated by stops on the feed mechanism of the equipment being used.

The cutter of the tool is designed so that after it reaches



the required recess diameter and the tool starts boring, the chamfer ground into the front end of the cutter acts as a boring tool. On completion of the boring cut, the tool is retracted and the finish or shaving cut is performed on the return stroke.

The Maxwell Co., Dep't IC, 250 Broadway, Bedford, Ohio, will supply literature, or — **No. D1.**

HOW SEIBERT SPINDLES HELP SUNDSTRAND

BUILD BETTER PUMPS

★ For 4 years, Seibert Multiple Drill Spindles have been helping maintain close tolerance standards at the Hydraulic Division of the Sundstrand Machine Tool Co., Rockford, Illinois. Multiple spindle drilling machines, as shown in the photo above, are equipped with 32 Seibert Slip Spindles and Adapters of varying sizes, for drilling, reaming, chamfering, and spot facing cast iron Fuel Unit Pump Bodies. Tolerances are held to within .002" of basic location, at spindle speeds ranging from 805 to 2760 R.P.M.

Investigate today, the three advantages of standardizing with Seibert production holding tools. You will find they will meet your most exacting tolerance requirements because they are precision built . . . you save money too, for Seibert holding tools are lot produced in a wide range of standard sizes . . . and your orders receive prompt, efficient handling because Seibert specializes in the manufacture of production holding tools only.

FREE DATA

Write for Folio 1-50 illustrating and describing the complete line of Seibert Multiple Drill Spindles.

SEIBERT & SON, INC. CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1101

F. LEROY HILL ELECTED CAMDALE BOARD CHAIRMAN

F. Leroy Hill, president of the Hill Machine Co., Rockford, was elected chairman of the board of Camdale, Inc., E. Detroit, at the annual stockholders' meeting.

A graduate of the University of California, in both mechanical and electrical engineering, Mr. Hill's specialty is the manufacture of precision parts and components for the aircraft industry. He is a member of the Society of Tool Engineers, Rockford chapter.

The Camco Division of Camdale, Inc. specializes in precision ground cams and the Dale Division produces ground gears, master gears, spline gears, and many other intricate parts for reciprocating jet engines.

GROWING PAINS

The 120,000 sq. ft., $1.5 million contemporary California style building to be built this summer by **Consolidated Engineering Corporation,** adjoining the company's main plant in Pasadena will house CEC's research, engineering, and marketing divisions.

◆

Another new **Allied Products Corporation** plant has recently been completed and occupied. The new building, just outside Detroit, serves as headquarters for the company's Richard Brothers Punch Division and Hercules Punch Division.

◆

American Saw Company's new hack saw plant at East Longmeadow, Mass., is built around a new straight-line manufacturing system that includes special company-built production machinery and electronically controlled heat treatment furnaces for "Lenox" hack saw blades.

◆

The new facilities acquired recently by **Pioneer Engineering and Manufacturing Company,** Detroit, provide the company with a total of 35,000 sq. ft. devoted exclusively to engineering and design use.

◆

Sundstrand Machine Tool Company recently completed an addition to its machine tool division facilities. The 29,000 sq. ft. plant located at Belvidere, Ill., will be used primarily for the assembly of the larger models of standard Rigidmils, special machines, and transfer type equipment.

◆

A new plant for the manufacture of grinding wheels is being equipped and will be opened early next year at Santa Clara, California, by the **Norton Company.** The one-story plant was purchased last fall for use as a warehouse, but recent decisions call for a manufacturing plant to serve the West Coast.

◆

The Chambersburg Engineering Company has begun construction of a large iron foundry to replace the existing facilities which have been in operation since 1906. In addition to providing castings for Chambersburg's forging equipment, an ample capacity will be available to serve the needs of castings customers.

The Microcast Division of **Austenal Laboratories,** a leading producer of investment castings, is expanding production facilities at its New Jersey plant with the construction of a new building at Rockaway Township. The new facility, which is scheduled for completion in August, is expected to increase Austenal production 37 percent.

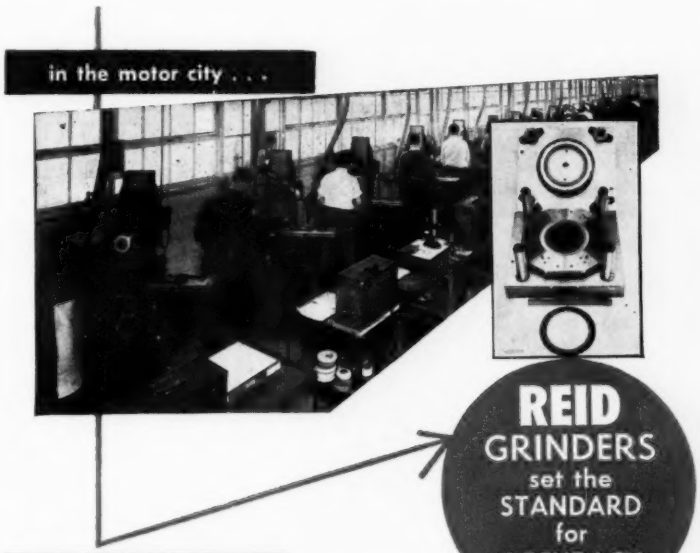
◆

Synthane Corporation, manufacturer and fabricator of thermosetting laminated plastics for industrial use, has started construction of a new 8,000 sq. ft. wing to their plant at Oaks, Pa.

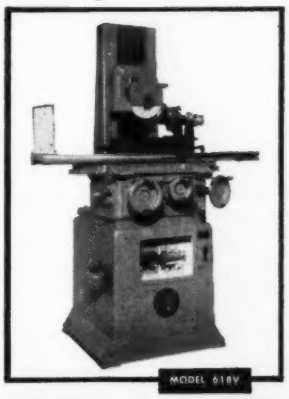
Plans for the construction of a $500,000 plant have been announced by **Miniature Precision Bearings, Inc.,** of Keene, N. H. The one-story structure located on a 7½-acre site in Keene will triple the company's present floor space.

◆

Management of **Acme Industrial Company,** Chicago, announces that their recent acquisition of an additional 38,000 sq. ft. of adjoining floor space has been remodeled to house screw machines, grinders, and honing machines and automatic bench lathes. Their heat treating equipment also will be transferred.



REID GRINDERS set the STANDARD for ACCURACY



In Detroit, at Commando Tool and Die Co., positive accuracy is a must in grinding the high-production tooling necessary for today's automobile and aircraft production race. Commando and many other shops in the area have found that Reid Surface Grinders provide the built-in accuracy that spells top performance year after year.

You, too, can have the precision, the better surface finishes, the dependability and convenience of operation that are engineered into every Reid Grinder. So why not plan now to replace the over-age surface grinders in your plant with new Reid Grinders.

Complete details are contained in Brochure 618-15 — request your copy today.

Reid Brothers Company, Inc.

BEVERLY, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 1111

World's Largest Extrusion Press

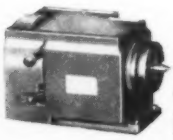
Several of the key pieces of equipment in the U. S. heavy press program for the aircraft industry have been contributed by Schloemann A. G. of Dusseldorf, West Germany, of which the Feller Engineering Company, Pittsburgh, are the exclusive agents in the U. S.

The world's largest extrusion press of 14,000 ton capacity which went into production in the spring of 1954 at Alcoa's plant, West Lafayette, Indiana, has exceeded expectations in its performance. Design work for this Schloemann press was started prior to World War II. The U. S. Schloemann Company recommended extrusion presses of larger capacity—up to 25,000 tons—to the U. S. War Production Board as early as 1942. Research at that time indicated that a 25,000 ton extrusion press was about the largest that could practically be built.

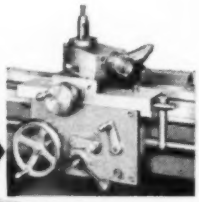
Schloemann A. G. has built heavy forging presses of 15,000 ton capacity which have been in operation in the United States for more than three years. These units which produce parts for the Air Force program and for commercial use are located in Michigan and Ohio. A giant forging press of 33,000 ton capacity was designed by Schloemann prior to World War II; it operated in Germany until 1945, when the Russians dismantled it and removed it to the Soviet Union.

Feller Engineering Company provides continuous maintenance and servicing facilities for all Schloemann equipment. In addition to heavy extrusion and forging presses other Schloemann products include hydraulic presses, and all types of auxiliary machinery.

from its big ball-bearing spindle . . . .



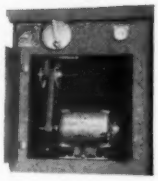
. . . . to the precision carriage . . . .



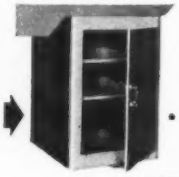
along its rugged, accurate bed . . . .

to the tailstock . .

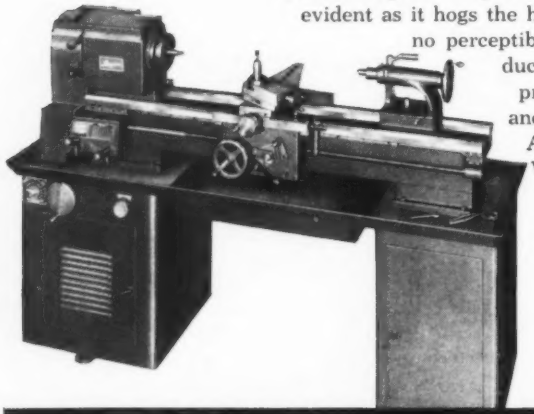
. . . . and down to the variable speed drive . . .



and its solid, strong, convenient cabinet



. . . . the No. 6560 Logan 14" Lathe is ruggedly proportioned, precision built and dynamically balanced. Its superiority is evident as it hogs the heavy cuts with almost no perceptible vibration, and produces precision results in production, maintenance and tool room operations. At your Logan dealer's. Write for Bulletin 14-L.



SPECIFICATIONS AND FEATURES

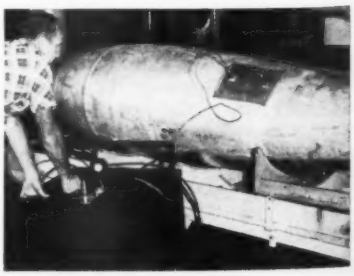
14⅝" swing over bed
9" swing over saddle
1⅜" spindle hole
1" collet capacity
40" between centers
Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm

LOGAN ENGINEERING CO.
4901 WEST LAWRENCE AVENUE • CHICAGO 30, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1121

Dents Pulled Out with Vacuum

Wing-tip tanks on an airplane are like the fenders on your car constantly exposed to dents. Straightening such dents was a costly operation and usually meant the tank had to be cut to pieces, until Martin developed a vacuum technique which pulls the dents out to the original smooth aerodynamic contours. The equipment is portable, so that it can be used at the airport, in the shop, or in final assembly. A plate, formed to the contour of the tank, is placed over the dent and sealed with a sponge rubber gasket. In its operation, connections are made to a two-stage vacuum pump, vacuum is then applied, and the dents pop right out. Even deformed stiffeners or stringers under the dented skin are straightened by this method.



Harry V. Stanton, formerly of Hamilton Steel Company, is now associated with **The Robert H. Newton Company,** Cleveland manufacturer's representatives for industrial equipment and production parts. Mr. Stanton covers the Akron territory in a sales capacity and, in the same area, is a direct representative of Dove Die & Stamping Company of Cleveland.

◆

Sig Straus has been appointed national sales manager of Larkin Welder & Machine Company, according to a report from the New York company's offices.

◆

The Wood & Spencer Company, 48-year old Cleveland manufacturer of standard and special taps and precision nuts, announced recently the appointment of **Paul Andrews** as sales representative for the territory covering the city of Cleveland west of E. 55 St., Elyria, and Lorain.

◆

Turchan Follower Machine Co., Detroit, has appointed **L. B. Mytinger** to the position of sales manager. A graduate of Michigan State college, Mr. Mytinger has been in machine tool sales for over eight years.

◆

Lincoln Engineering Company, St. Louis manufacturer of lubricant application equipment, has appointed **Robert E. Crean** as manager of the company's Philadelphia industrial branch sales office, succeeding **M. C. Hazenfield,** who has retired.

◆

R. K. Rawlins, who has been on the Chicago sales staff of Lindberg Engineering Company for several years, has been appointed district manager of the Texas-Louisiana area, with offices in Dallas.

◆

C. H. McCollam, general manager of the Steel Sales Division of the Timken Roller Bearing Company has announced the following transfers and promotions: **W. J. Brigham** replaces the late **Harry Lilley** in the company's Detroit office as district manager; **John J. McGrann** succeeds Mr. Brigham as district manager of the Cincinnati office; **Ralph Preston** succeeds Mr. McGrann as Houston district manager; and **Edwin E. Lightfoot,** who has recently completed a period as a sales trainee, succeeds Mr. Preston as sales engineer in the Houston office.

Acheson Colloids Company recently appointed **Wallace J. Keith** as sales engineer, to open the company's second Ohio sales office in Dayton. Mr. Keith and the Dayton office will serve western and southern Ohio and most of Indiana and Kentucky.

◆

Two changes in Norton Company's sales organization have been announced recently. **Harlan W. Cobb** is now a field engineer in the New England-New York State territory, and **Alfred C. Wormer** succeeds Mr. Cobb as abrasive engineer in Northern Ohio.

Vaux H. Adams is now assistant manager of Firth Sterling's Detroit district. He joined Firth Sterling, Inc., in 1950 as a salesman in that district.

◆

The appointment of **William O. Hall** as chief field engineer of the C. A. Norgren Company was recently announced by **D. G. Faust,** vice president in charge of sales and advertising. Mr. Hall's new duties will expand Norgren customer service facilities by providing technical assistance to meet the needs of industry for proper compressed air filtration, regulation, and lubrication.

Brand New!

haskins

haskAIR Grinder...

most powerful air turbine grinder in its class!

75,000

R.P.M.

(1/5 H.P. prony brake test)

- **Permanently sealed bearings . . . never needs lubrication in air lines or grinder.**
- **Removable nose piece for deep grinding.**
- **Gyro action of turbine holds tool steady.**

Here's power—SUSTAINED POWER—like you've never experienced before in an air grinder . . . power unexceeded by any other air grinder in the same price range . . . **maintains its high-speed efficiency under load!** Built with a lightweight, contoured, hand-fitting aluminum housing, the Haskins haskAIR Grinder handles easily, balances perfectly . . . excellent for the most precise grinding job. Complete kit includes: carrying case, adapter hose, mounted points, dressing stone and wrenches.

for Complete details

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haskins

HASK-AIR HASK-FLEX

605 S. Washtenaw
Chicago 12, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1131

With Permanent Magnetic Chuck

NEW *Vulcan* MOTORIZED ROTARY TABLE

for lapping and grinding

(not an index table)

With Lapping Plate

FASTER
circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.

For example, Vulcan's Rotary Table can be used in connection with a sine plate or angle fixture. The dressing of large expensive external wheels for side grinding is therefore eliminated. If you wish we can provide permanent magnetic chucks designed for use with our table, both 6″ and 10″ in diameter.

Work clamped to motorized table, mounted on sine plate. Surface grinder application.

Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

Lapping? Yes — and in micro inches. For the 6″ and 10″ table, lapping plates of 12″ and 16″ are provided. Perfect for lapping valve plates, gages, bearing spacers and for carbide lapping using diamond powder. *Write for circular.*

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

VULCAN TOOL CO.
20 PRITZ STREET • DAYTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1141

Use postage-free Inform-A-Gram Key Number Card for your request

This Drill and Reamer booklet features the design, construction, and correct usage and care of drills and reamers, with special notes pertaining to carbide tools. Though prepared especially for apprentices and students, it is packed with information of value to even the most seasoned machinist. It also contains information on tap and drill sizes and basic thread dimensions of machine screw sizes, recommended feeds and speeds and coolants, etc. Whitman & Barnes, Plymouth, Mich., or —
Circle Inform-A-Gram No. C1.

"Damping Devices — Past, Present, and Future" reviews the development of damping devices from the first simple dash pot to today's compact, efficient Gabriel unit which is adaptable to industrial as well as automotive applications. It includes a complete description of the development and use of closed circuit diagrams and load-velocity charts for the measurement of damping device performance, and shows how the Gabriel "Trigraph" is used for visualizing and planning damping actions to meet every requirement. The Gabriel Co., Dep't 5J, 1148 Euclid Ave., Cleveland 15, or —
Circle Inform-A-Gram No. C2.

A Rust Preventive Use Chart is being offered by Nox-Rust Div'n, Daubert Chemical Co., 333 N. Michigan Ave., Chicago 1. The characteristics of a number of Nox-Rust preventive oils and compounds are described on the chart and the products currently in use for machine tool lay-away and government contracts requiring preservative packaging are listed. Chart No. 225 also contains the table of preservatives as given in MIL-P-116C (proposed) for army, navy, and aeronautical requirements. **No. C3.**

Seventeen Methods of Joining Stainless Steel by fusion processes are described in the newly-revised booklet, "The Joining of Crucible Rezistal Stainless Steels." These processes include manual, automatic, and semi-automatic welding, brazing, and soldering. The booklet also contains a section describing eight flame and arc cutting procedures commonly used for severing stainless steel. Crucible Steel Co. of America, Box 88, Pittsburgh 30, Pa., or —
Circle Inform-A-Gram No. C4.

"Spring Lock Washers — Their Principles" is an illustrated, elementary explanation of how the tightness of assembled parts is developed and how the loss of tightness may be substantially reduced. Special sections give A.S.A., S.A.E., and A.S.M.E. specifications for spring lock washers, procedure and method of preparing these washers for Rockwell hardness test, and descriptions of some types of spring lock washers. Spring Washer Institute, 74 Trinity Pl., New York 6, or — **No. C5.**

Circular and Diametral Pitch Knurling data is presented in Bulletin 50-10 from Reed Rolled Thread Die Co., Worcester 1, Mass. The very large, illustrated booklet gives general information on knurling and handling applications in the screw machine industry and special sections are devoted to circular pitch and diametral pitch knurling, the selection of tools, and knurling on screw machines and lathes and on thread rolling machines.
Circle Inform-A-Gram No. C6.

Flowcoating in its simplest form can be accomplished by pouring paint from a can onto the object to be coated. In actual practice the paint can be pumped through a hose and hydraulic nozzles onto the surfaces being coated. The process is being used today for applying primers and topcoats on a wide variety of articles, such as appliances, machinery, and miscellaneous metal parts. The recently published Du Pont technical bulletin on flowcoating describes the process and includes sections on the limitations of flowcoating, operation variables, surface preparation, primers, topcoats, and thinners. Du Pont Finishes Div'n, Room 7145-D, Wilmington 98, Del., or —
Circle Inform-A-Gram No. C7.

Gamma Radiography—a non-destructive testing method utilizing radioactive isotopes—is comprehensively covered in a 12-page reference booklet from Technical Operations, Inc. It presents the basic information required for setting up or operating a gamma-radiography installation; tells how to select the proper radioisotopes for handling equipment; and discusses the principles of radiation safety. Tables and charts show characteristics, radiographic sensitivity, and speed of isotopes. Technical Operations, Inc., 6 Schouler Ct., Arlington, Mass., or—
Circle Inform-A-Gram No. C8.

The 1955 Buyers' Guide for the Design of Screw Machine Products is edited for maximum efficiency in designing and specifying screw machine products. Topics such as What Increases Costs, Design Considerations, and Samples. National Screw Machine Products Association, 2860 E. 130 St., Cleveland 20, Ohio.
Circle Inform-A-Gram No. C9.

This Screw Machine Stock "Fact Pack" is jammed full of charts, calculators, and books for valuable quick-reference for aluminum screw machine stock users. Included are two slide-type calculators—a speed chart, and a combination design calculator (listing physical and mechanical properties) and aluminum rod size and weight chart; 104-page "Alcoa Aluminum in Automatic Screw Machines"; and 100-page "Corrected Tool Diameter Tables." Get yours from Aluminum Corp. of America, Pittsburgh 19, Pa., or —
Circle Inform-A-Gram No. C10.

MEN YOU SHOULD KNOW

The Weldon Tool Company of Cleveland has announced the election of **Walter C. Bergstrom** as president, succeeding his father, **Carl A. Bergstrom,** who became chairman of the board. At the same time, **Paul R. Hatch** was elected executive vice president.

◆

Appointment of **George A. Hinckley** as general sales manager of the Automatic Transportation Company, producer of electric-driven industrial trucks, was announced recently.

Adolph Vlcek, Jr., has been named tooling manager at Martin, Baltimore. He has served as quality control manager since 1953.

◆

H. M. Dardani, formerly chief process engineer, has been appointed vice president for manufacturing of Precision Bearings, Inc., makers of precision instrument ball bearings. **R. H. Carter** has been named chief engineer and **R. H. Gengenbach** is now manufacturing superintendent at M. P. B.

Election of **Robert C. Overstreet** as president of Tinnerman Products, Inc., has been announced by **A. H. Tinnerman,** chairman of the board. Mr. Overstreet who joined the company in 1941, succeeds **George J. Schad,** who has retired. **John E. Potter,** formerly comptroller, has been elected secretary and treasurer of the large fastener manufacturing firm, and also to the board of directors.

◆

Albert F. Polk, vice chairman of The Sheffield Corporation, Dayton, has accepted an invitation issued by the Business and Defense Service Administration, Washington, D. C., to serve for a limited period of time as chief of the Facilities, Distribution and Inventory Branch, Metalworking Equipment Division.

◆

Gilbert T. Coovert, general manager of The V & O Press Co., division of Emhart Mfg. Co., has also been named general manager of Emhart's Henry & Wright Division in Hartford. He joined V & O as personnel director in 1950, was appointed acting factory manager in 1951, and was promoted to assistant general manager and then general manager during the following year.

◆

Election of **Vincent P. Reinfeld** as president of Pyrosil, Inc., Cuyahoga Falls, Ohio, manufacturers of industrial electroplating, infrared oven, and acid pickling accessories, was recently announced. Mr. Reinfeld has been associated with Executive Services of Cleveland, management consultants, and will continue to serve as a technical consultant for the firm.

◆

The Amthor Testing Instrument Company announced recently that **Albert Tintner,** formerly with Newage International, Inc., has joined their organization as general sales manager.

◆

At the annual board of directors meeting, **C. H. Kimmel** was elected president of The Ohio Crankshaft Company, Cleveland. He joined Ohio Crankshaft in 1940 as factory manager of the crankshaft and camshaft division and has also held the positions of general manager of this division, vice president, and general manager of the entire company. At the same meeting **M. J. Hoke** was named vice president and general manager of the crankshaft and camshaft division. **W. C. Dunn,** cofounder and president of Ohio Crankshaft since its founding in 1920, continues his long association with the company as board chairman.

NEW
A BIG ADVANCE IN BELT SANDERS
WALLS
TU-WAY BELT SANDER
HORIZONTAL
USE IT EITHER WAY
VERTICAL
It takes the leader to show the way! The new WALLS 'TU-WAY' BELT SANDER offers all the most wanted features yet sells for such a low price.
It's a rugged industrial sander of top quality throughout. Try it—see if you don't agree that it's the BIGGEST SANDER VALUE YET!
Check These WALLS TU-WAY Advantages:
Instantly adjustable from horizontal to vertical and back again. Simply loosen one nut. No time lost.
Swift action thumb screw for instant belt adjustment.
Extra fast, easy belt changing.
Balanced aluminum pulleys for smoother operation and longer life.
Full ⅓ h.p. G. E. motor.
Permanently sealed bearings require no lubrication.
Outboard bearing arm takes up overhang on drive pulley.
Center leg eliminates strain in horizontal position.
Large work table with mitre gauge slot for use in vertical position . . . available at slight additional cost.
WALLS TU-WAY BELT SANDER
Complete with cord, plug and "on-off" switch . . . ready to plug in and use. Only $89.95
Illustrated Literature on Request
A few desirable distributor territories still available.
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CIRCLE INFORM-A-GRAM KEY NO. 1161

MEN YOU SHOULD KNOW

Two new general officers have been elected by the board of directors of the Gisholt Machine Company. **Frederick L. Chapman,** formerly of Sales, has been elected a vice president. **George M. Class,** formerly of Engineering, has also been elected a vice president. Mr. Chapman has also been made a member of the board of directors, succeeding **Claude K. Swafford,** who retired earlier this year.

◆

Robert C. McDowell, president of McDowell Company, Inc., has announced the appointment of **Harold E. Rowan** as general manager of the firm's new Dwight-Lloyd Division. Mr. Rowan was formerly vice president of Sintering Machinery Corporation, producer of Dwight-Lloyd sintering machines, all assets of which were recently acquired by McDowell Co.

◆

Appointment of **Jack L. Modrich** as executive vice president of the Hydro-Line Manufacturing Company, Rockford, was made recently. A specialist on air and hydraulic field sales engineering problems, he is an authority on the adaptation of hydraulic and air cylinders to automation problems.

◆

General Walter Bedell Smith has been named chairman of the board and president of AMF Atomics, Inc., a wholly-owned and newly-formed subsidiary of American Machine & Foundry Company. In addition to General Smith, the members of the board of AMF Atomics, Inc., are **George S. Hills, Murray McConnel, Stanley deJ. Osborne,** and **Eugene Zuckert.**

◆

Donald R. Fegley has been appointed chief engineer of Reed-Prentice Corporation, Worcester, Mass., affiliate of Package Machinery Company. He joins Reed-Prentice after serving as chief engineer of Consolidated Molded Products Corporation, Scranton, Pa.

◆

Appointment of **E. M. Detwiler** as works manager of Lake Erie Engineering Corporation has been announced by President **Robert E. Dillon.** Mr. Detwiler, general superintendent since 1953, was formerly assistant works manager of Worthington Corporation's Buffalo plant and works manager of the plant at Holyoke, Mass. Three newly created offices at Lake Erie have been filled by **William H. Bennett** as sales manager, **Robert W. Gerhardt** as sales project engineer for the company's line of die casting machines, and **Robert J. Fuller** as assistant treasurer.

Two executive appointments at Westinghouse Electric Corporation's elevator division plant were recently announced by **N. Shakotko,** manager of manufacturing. **R. K. Pond,** formerly industrial engineer for the division, is now superintendent of the production department, and **H. R. Schlop** is division industrial engineer.

◆

Merritt L. Smith has been appointed executive advisor of Metal & Thermit Corporation, producers of metals, industrial chemicals, and welding equipment. Mr. Smith's experience covers more than 20 years in sales administrative work concurrent with advertising. As staff coordinator, he will assist the president in integrating the company's varied sales activities.

◆

James A. Arter has been appointed vice president in charge of manufacturing for Ampco Metal, Inc. **E. E. Jagmin** will continue as general superintendent in charge of production.

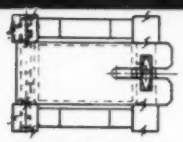
CIRCLE INFORM-A-GRAM KEY NO. 1171

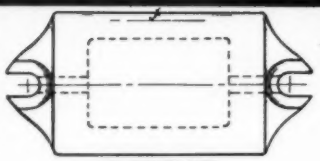
$AVE DOLLAR$
WITH NOBLE & STANTON
Standards
Save 2/3 the Cost of Custom Making!

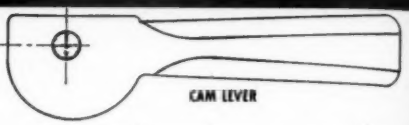
Complete Line of Top Quality
JIG and FIXTURE COMPONENTS
Stocked for Quick Delivery from Dealers Coast-to-Coast

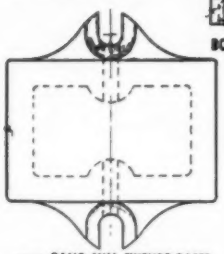
CUT Man-Hours—CUT Design Time—CUT Toolroom Costs

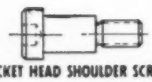
SPHERICAL WASHERS

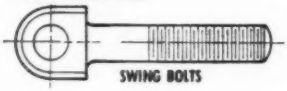

BOX JIGS—RECTANGULAR

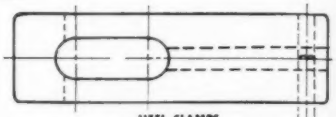

MILL FIXTURE BASES

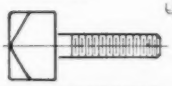

CAM LEVER

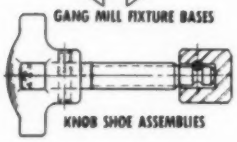

GANG MILL FIXTURE BASES


SOCKET HEAD SHOULDER SCREWS

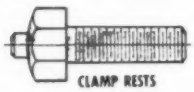

SWING BOLTS

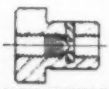

HEEL CLAMPS

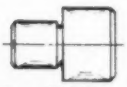

QUARTER TURN SCREWS


KNOB SHOE ASSEMBLIES

GROUND THREAD STUDS

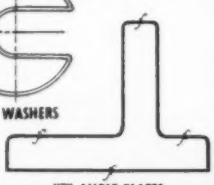

CLAMP RESTS


SURE LOCK FIXTURE KEYS


JIG FEET

ADJUSTING HEAD SCREWS

"C" WASHERS


"T" ANGLE PLATES

ADJUSTING HALF NUTS

FLANGE NUTS

OVER 500 COMPONENTS AVAILABLE!

HERE ARE NEW ITEMS IN OUR LINE—

- Double Cam Assemblies (9 sizes)
- Chuck jaws (5 sets fit 45 different chucks)
- Flat Nose Heel Clamps (13 sizes —left Soft for your alteration.)
- Equalizing Assemblies
- Swing "C" Washers
- Equalizing "C" Washers
- Eye Bolts
- Acorn Nuts
- Sure Lock Fixture Key and Buttons
- Fixture Keys
- Jig Legs
- Jig Leg Plates
- Torque Screws
- Toggle Pads
- Locating Pins
- Ball Hand Knobs
- Double Cam Levers

Listed above are new additions to our line. The drawings show a few of our many widely accepted, fine quality Standards... which include Mill Fixture Bases, Box Jigs and our popular T-Angle Plates which are exclusive with Standard Parts Company.

Tracing sheets which save design time are available for every part. Get complete details and facts by writing for our 66-page Catalog.

WRITE FOR FREE 66-PAGE CATALOG

OR USE INFORM-A-GRAM NO. 1181 ON OPPOSITE PAGE

Manufacturers of GENUINE NOBLE & STANTON Parts

STANDARD PARTS CO.

1002 BROADWAY • BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1181

INFORM-A-GRAM JUNE, 1955 ISSUE

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7	25	44	62	1012	1141	1341	1502	1564	1822	1692	1741	1791	1851	1931	
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9	27	46	65	1031	1171	1371	1504	1581	1824	1702	1743	1801	1871	1933	
10	28	47	66	1041	1181	1381	1505	1582	1831	1703	1744	1802	1872	1934	
11	29	48	67	1051	1191	1391	1506	1583	1832	1704	1745	1803	1873	1941	
12	30	49	68	1052	1201	1401	1511	1584	1841	1711	1751	1811	1874	1951	
13	31	50	70	1053	1211	1411	1512	1591	1842	1712	1752	1812	1875	1952	
14	32	51	911	1061	1231	1421	1513	1592	1843	1713	1761	1813	1876	1961	
15	33	52	921	1071	1241	1431	1514	1593	1851	1714	1762	1814	1881	1962	
16	34	53	941	1081	1251	1441	1541	1601	1861	1721	1763	1821	1891	1963	
17	35	54	951	1082	1261	1451	1542	1602	1862	1722	1764	1822	1892	1971	
18	36	55	961	1083	1271	1461	1543	1603	1863	1723	1765	1823	1893	1972	

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A1	A19	A37	A55	B8	B26	B44	B62	C6	
A2	A20	A38	A56	B9	B27	B45	B63	C7	
A3	A21	A39	A57	B10	B28	B46	B64	C8	
A4	A22	A40	A58	B11	B29	B47	B65	C9	
A5	A23	A41	A59	B12	B30	B48	B66	C10	
A6	A24	A42	A60	B13	B31	B49	B67	D1	
A7	A25	A43	A61	B14	B32	B50	B68		
A8	A26	A44	A62	B15	B33	B51	B69		
A9	A27	A45	A63	B16	B34	B52	B70		
A10	A28	A46	A64	B17	B35	B53	B71		
A11	A29	A47	A65	B18	B36	B54	B72		
A12	A30	A48	B1	B19	B37	B55	B73		
A13	A31	A49	B2	B20	B38	B56	B74		
A14	A32	A50	B3	B21	B39	B57	C1		
A15	A33	A51	B4	B22	B40	B58	C2		
A16	A34	A52	B5	B23	B41	B59	C3		
A17	A35	A53	B6	B24	B42	B60	C4		
A18	A36	A54	B7	B25	B43	B61	C5		

Which article in this issue was of most interest to you? _____

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INFORM-A-GRAM JUNE, 1955 ISSUE

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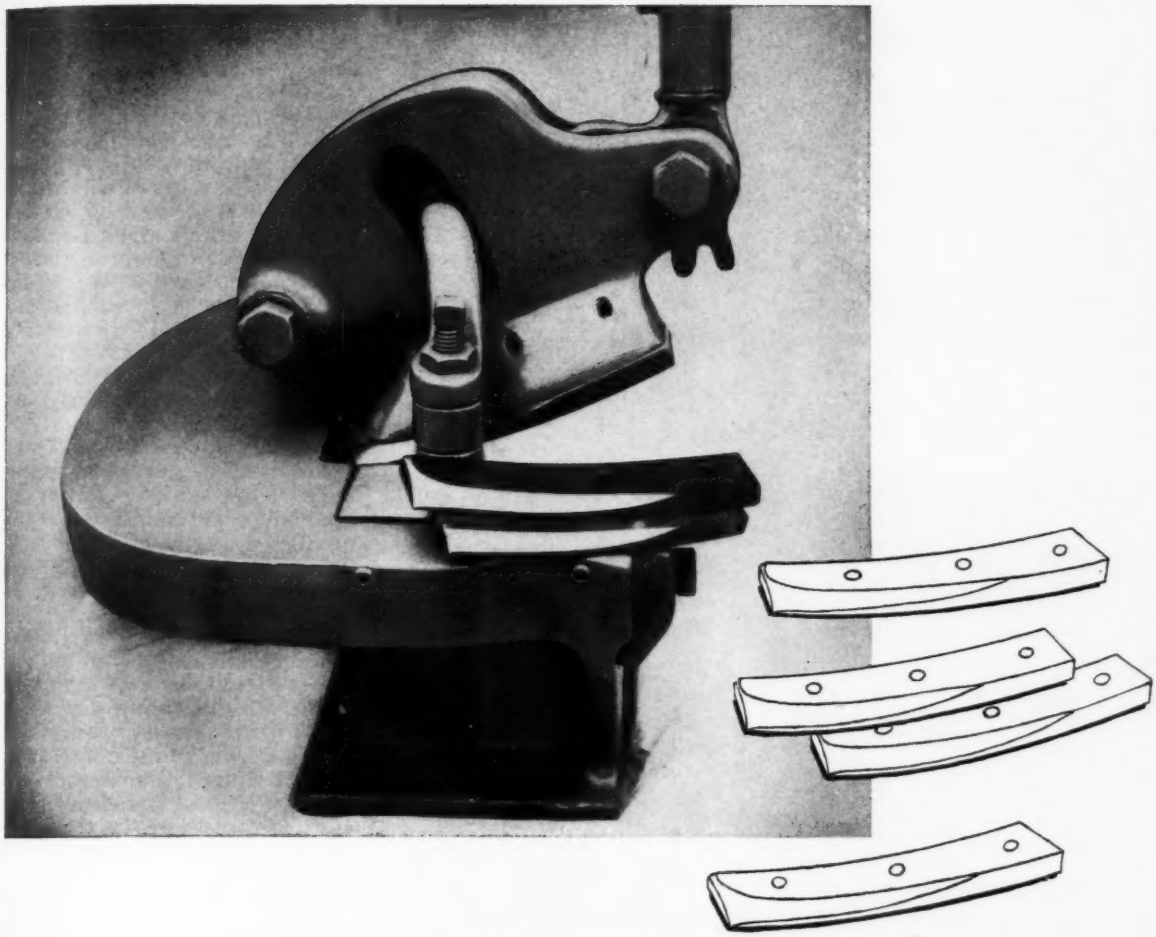

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A compilation of facts on the handling and shop treatment of Huron. Includes complete information on forging, annealing, tempering, etc. and detailed laboratory data on physical characteristics. *Ask for your free copy.*

ADDRESS DEPT. TP-66

A Chicago bench shear manufacturer produced some test blades of Ludlum HURON die steel—heat treated to 61-62 Rockwell C.

Service life of the HURON blades proved to be four to five times that of the former blades. Resharpenings were reduced 75 to 80%! Because these new HURON blades held an exact rake and maintained a proper cutting arc, they easily sheared 3/16" mild steel or 10 gauge stainless.

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CIRCLE INFORM-A-GRAM KEY NO. 1191

SPEED SELECTOR FEATURED IN NEW LATHE

"Set it—forget it" is the descriptive slogan applied to Monarch Machine Tool Company's new Series 62 Preselector Dyna-Shift lathe.

Basic in the design of the new lathe is the Dyna-Shift headstock, first introduced by the company three months ago in a Series 90 heavy duty lathe. The added feature—speed preselection — with which this newest machine is equipped has been incorporated with the Dyna-Shift type of headstock to make possible further substantial savings in over-all machining time.

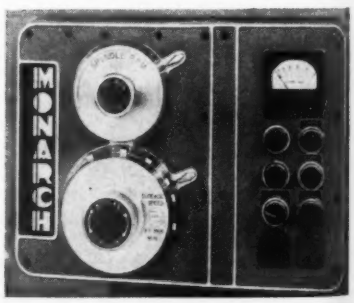
Major design feature of the new machine is the Preselector Dyna-Shift, the controls for which have been incorporated in the front of the headstock. They consist of (1) a large surface speed setting dial, (2) a large work diameter setting dial, (3) a set of diameter preselectors, (4) a large spindle rpm indicator dial and (5) a knob which frees the spindle from the gear train.

With these controls, all that an operator has to do is to set the dials for work diameter and surface feet per minute required, the Dyna-Shift computes the rpm and makes the shift automatically and hydraulically to give the correct spindle speed at which to operate. Trouble-free operation is assured by a particularly efficient manifolding system.

The surface speed may then be maintained on succeeding diameters of the work by setting up the values of the latter on the numbered, adjustable work diameter selectors provided with the new Preselector control. Every speed change thereafter, on every piece in the run, takes place automatically with but one fast dial setting and movement of the work start and stop lever.

Work start and stop is controlled by a lever at the apron operating position. For setup purposes, there is a second work start and stop lever at the headstock end of the machine. These levers have three positions — RUN, BRAKE and JOG. There is fingertip shifting from one position to another because clutching, braking and jogging are all accomplished hydraulically—with the levers simply opening valves.

When speed preselection is being used, the JOG also becomes the SPEED CHANGE position. With multiple disc brake and



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clutch hydraulically actuated, the braking is immediate, smooth and shockless.

When the first cut is finished, the work start and stop lever is moved to its SPEED CHANGE position. Immediately, the dyna-shift mechanism automatically makes the needed shift to provide the speed which has been preselected for the next diameter. The operator then moves the work start and stop lever to the RUN position and work rotation resumes at the new speed. The correct speeds for each of the remaining diameters on the workpiece are obtained just as automatically and positively.

The preselection feature of the new machine permits increasing or decreasing the speed at will as operations progress. Once the diameter preselectors have been set for a given workpiece, as many of these pieces can be turned as desired without further thought being given by the operator to the speeds to be used.

With the Dyna-Shift headstock, the operator never needs to convert rpm to fpm, nor need he bother what rpm he is using although a large indicator dial is provided to show at a glance the spindle speed being used.

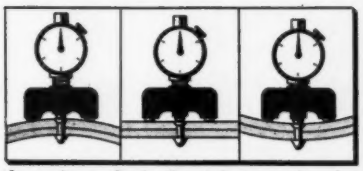
For added convenience, particularly when using the new speed preselection, the face of the surface speed dial also registers the speed at which the spindle is rotating. However, when the operator resets the work diameter dial to a preselected speed, the surface speed dial is also reset and then indicates the new rpm at which the spindle will rotate following the shift. The spindle rpm indicator, on the other hand, does not show the preselected speed until the shift actually takes place.

INDICATOR GAGE CHECKS SURFACE FLUSHNESS

Variance of protrusion or indentation of installed screws and rivets in sheet metal assemblies can be accurately checked by the Aircraft Surface Flushness Gage. Offered by The Hi-Shear Rivet Tool Company, this gage employs a dial indicator mounted on a three-point base. A threaded adaptor provides up or down adjustment of the indicator button as required for flat, concave or convex surfaces.

In the aircraft industry, the gage is generally used to help an operator or inspector to develop the "eye" or "feel" for repetitive inspection and then to verify such inspection by spot checking. Differences of opinion between Production and Inspection can be quickly checked.

The surface flushness gage has countless applications outside of



the aircraft industries — in determining relative flushness of fasteners in myriad products, in detecting and evaluating local surface irregularities, in determining flatness or sphericity of small products, and whatever else your imagination suggests.

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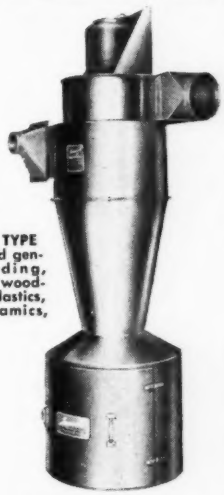

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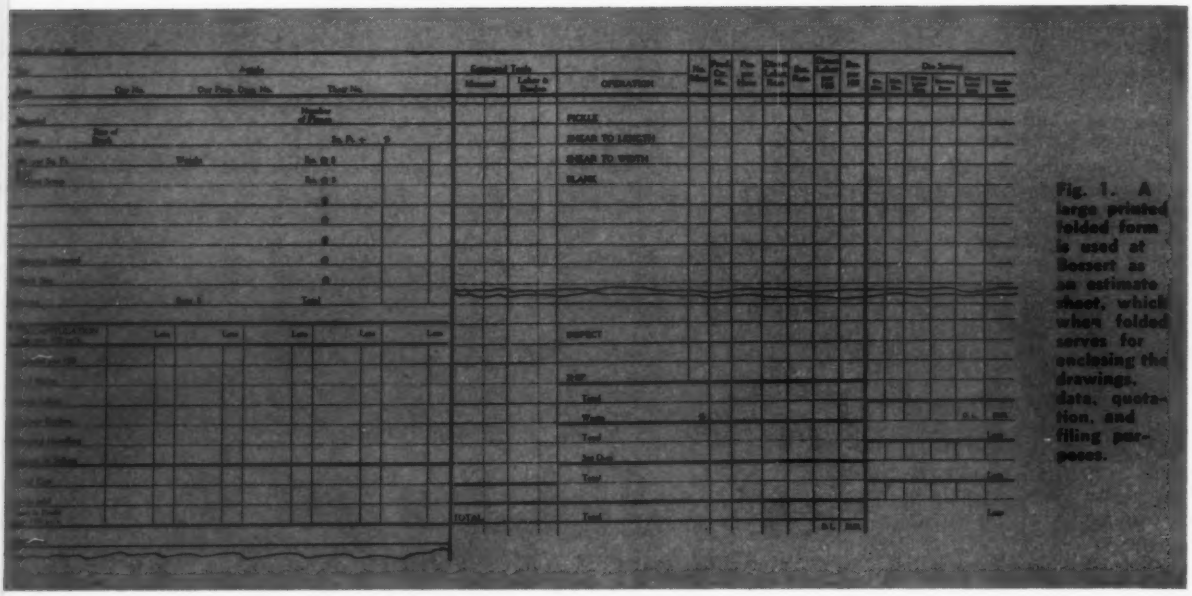

Fig. 1. A large printed folded form is used at Bossert as an estimate sheet, which when folded serves for enclosing the drawings, data, quotation, and filing purposes.

THE TECHNICAL SIDE OF ESTIMATING

by George E. Fauth, Chief Engineer
Bossert Division
ROCKWELL SPRING & AXLE COMPANY
Utica, New York

WHEN AN INQUIRY is brought or sent to Bossert, it is subject to acceptance by our Sales Department on the basis of desirability for our equipment, number of pieces involved, and geographic location of customer in relation to Bossert at Utica, N. Y.

If the Sales Department thinks the part undesirable for any reason, the inquiry is immediately rejected by them and the prospective customer notified of the reason for rejection. If the inquiry looks attractive to Sales for estimating, the prospective customer is notified approximately when to expect a quote. At the same time, the inquiry is turned over to the Engineering Department for their acceptance as drawn up, or for possible criticism of tolerances or material specification clarification, or perhaps to get concessions on radii or shape to make a better stamping with perhaps fewer operations.

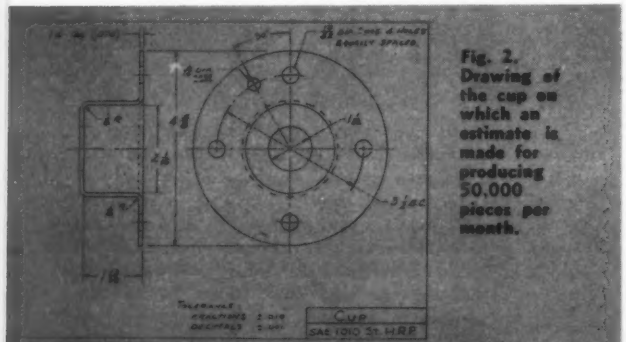

Fig. 2. Drawing of the cup on which an estimate is made for producing 50,000 pieces per month.

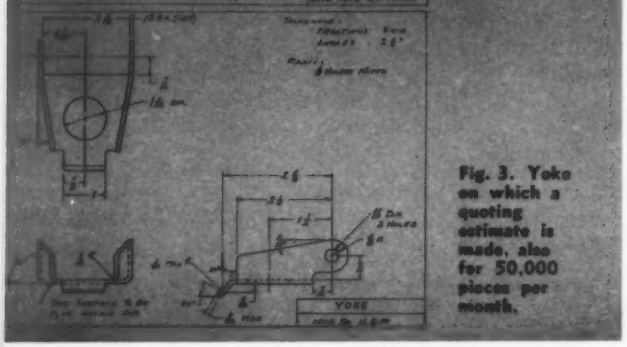

Fig. 3. Yoke on which a quoting estimate is made, also for 50,000 pieces per month.

After Sales and Engineering have examined the print, our estimators prepare the estimate, which of course, will determine our quoted price. At Bossert we use a large printed folded form, Figure 1, as an estimate sheet; this sheet when folded is used as an enclosure for the drawing, data and quote when the part is estimated and filed, for acceptance or rejection by the customer.

The first step in the preparation of a Bossert estimate for the cup as shown in Figure 2, after the form is filled out as to the date, customer name and address, article and customer

. . . *Continued on page 124*

Editor's Note. A well organized estimating method for quoting on prospective business is a most important function in any plant. To illustrate an efficient method, two stampings, Figures 2 and 3, were the subject of discussion at the recent Spring Technical Meeting of the Pressed Metal Institute.

Mr. Fauth detailed the procedures followed at the Bossert Division Rockwell Spring & Axle Company in estimating for quoting on 50,000 pieces per month of each stamping. Final quoted prices naturally were not given.—C.F.B.

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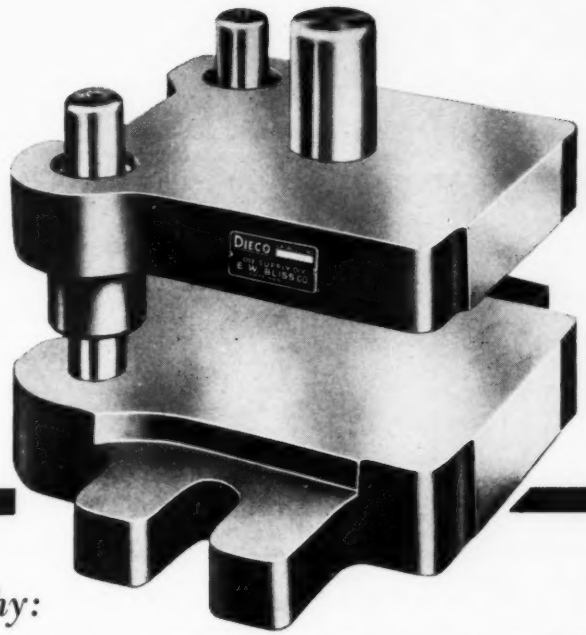

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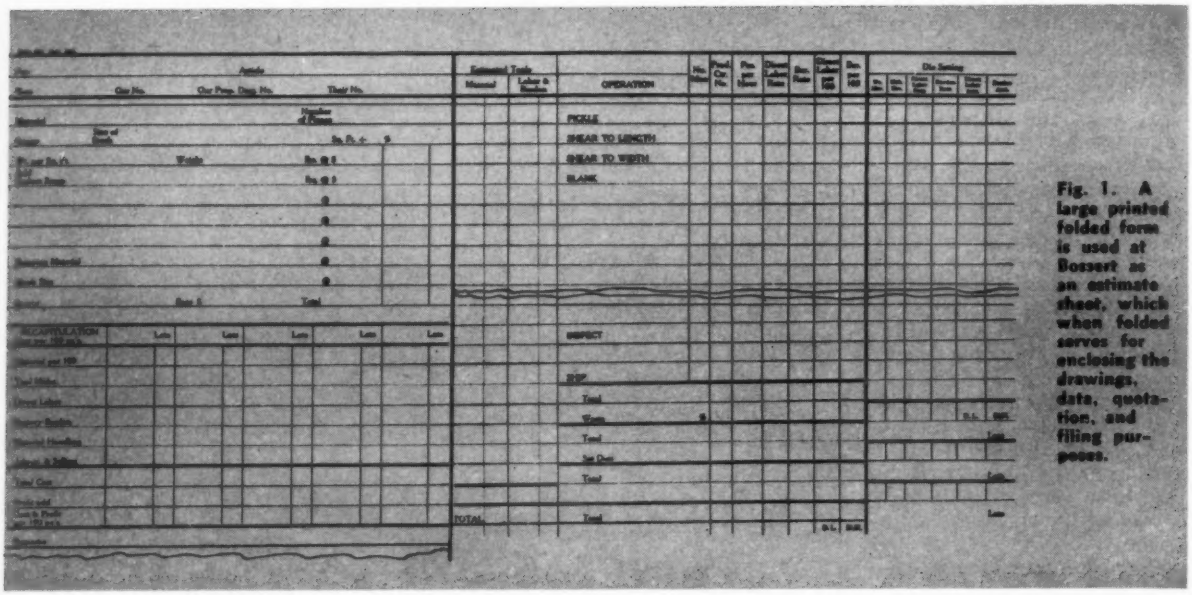

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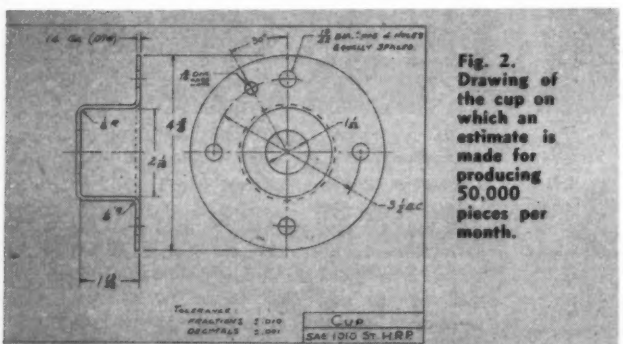

Fig. 2. Drawing of the cup on which an estimate is made for producing 50,000 pieces per month.

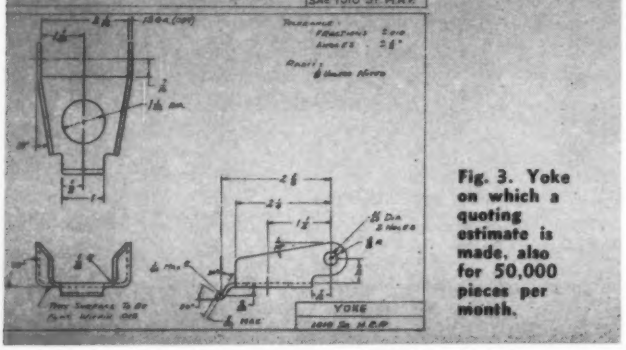

Fig. 3. Yoke on which a quoting estimate is made, also for 50,000 pieces per month.

After Sales and Engineering have examined the print, our estimators prepare the estimate, which of course, will determine our quoted price. At Bossert we use a large printed folded form, Figure 1, as an estimate sheet; this sheet when folded is used as an enclosure for the drawing, data and quote when the part is estimated and filed, for acceptance or rejection by the customer.

The first step in the preparation of a Bossert estimate for the cup as shown in Figure 2, after the form is filled out as to the date, customer name and address, article and customer

. . . *Continued on page 124*

Editor's Note. A well organized estimating method for quoting on prospective business is a most important function in any plant. To illustrate an efficient method, two stampings, Figures 2 and 3, were the subject of discussion at the recent Spring Technical Meeting of the Pressed Metal Institute.

Mr. Fauth detailed the procedures followed at the Bossert Division Rockwell Spring & Axle Company in estimating for quoting on 50,000 pieces per month of each stamping. Final quoted prices naturally were not given.—**C.F.B.**

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. . . Estimating, from page 122

number on the outside and inside of the estimate, would be to determine the blank dimensions of this cup.

On a round part, this of course, can readily be done by getting the number of square inches in the finished part with a trimming allowance, then picking a suitable circle from a table of circle areas. This particular cup would require a blank of 5⅞" dia. which is noted on the estimate.

We would now note on our estimate: the material, which is hot rolled, pickled and oiled; the quantity of pieces in the run, which in this case would be 50,000 (month's supply); the gauge 0.074"; and the size of the stock, which would be multiples of 5⅞" dia. plus stock for blanking, and in a width and length that could be procured at the best price. The stock size for this cup would be 6" x 6" for one piece or 36" x 120" for 120. We then compute the number of square feet required for 50,000 pcs allowing 3% for overgauge as we have found that sheets do usually come overgauge more often than undergauge. Therefore 50,000 cups plus 3% would require 12,875 sq. ft.

The weight of 0.074" ga., 3.095 psf, will give us 39,848 lbs of stock for 50,000 pcs, which delivered in Utica would be priced at $5.76 per cwt. This is made up of: a base price of $4.05; $ .45 ga. and width extra; deep drawing extra $ .25 per cwt.; length extra $ .20 per cwt.; pickling extra $ .45 per cwt.; and freight $ .36 per cwt.

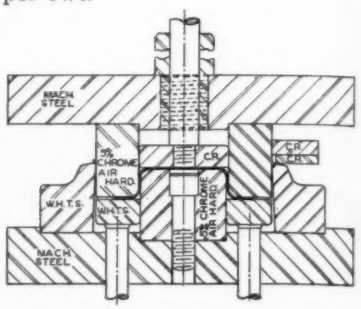

Fig. 4. Typical design for compound, blank and draw tools used on straight side press with air cushion in producing the cup.

It should be noted that at Bossert we have complete pickling facilities but have found it advantageous to buy all stock 3/32" and under, pickled from the mill.

After the total dollar value for 50,000 pcs is found to be $2295.24, the material shipping cost of $ .20 per hundred times 500 is added. The entire amount, $2395.24, is then divided by 500 which will be the material price per hundred of the 50,000 pcs we are estimating. This figures $4.79 per C and is entered as the first figure in our recapitulation column directly under the 50,000 lot.

We are now ready to list the operations; estimated production; die setting; waste factor; and fringe percentage on our estimate sheet, as soon as the operations are determined. It is apparent that, after the stock is sheared to width, the cup should be blanked, drawn, then reduced to get the 2 1/16" ID, followed by a forming operation primarily to sharpen radii, followed by a combined trim and perforate.

At Bossert we figure that with the best drawing quality steel and good die construction, a reduction of about 48% for this 5⅞" blank is possible on such

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non-push-thru parts. This would make the outside diameter of the draw operation 3 1/16" and from our tonnage chart would require about 45 tons for blanking, drawing and blankholding combined—17 tons for blanking, 25 tons for drawing and 3 tons for blankholding.

We would also figure a reduction of about 30% for the reducing operation, on a non-push-thru part, and 70% of 3 1/16" would give us 2.139" or the smallest outside diameter possible in two operations using a 5⅞" blank to start. As this diameter is approximately the same as the OD of 2.210", we can assume the part to require two reducing operations or a draw and a reduce. The press used should be about 25 tons.

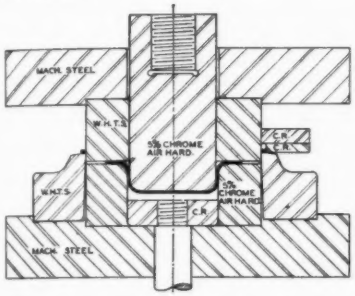

Fig. 4a. Design of compound blank and draw tools used on a toggle press in the cup production.

As we are cold working the 0.074" steel to the maximum we could assume a wash, anneal and pickle between the combined blank-and-draw and the reduce operations might be required. We would add same to our estimate, although we would hope to make the part without the wash, anneal and pickle and might notify the customer of the possibility of eliminating same and give him the cost, which he could deduct if we are successful in eliminating this wash, anneal and pickle.

The form operation which would be primarily to sharpen the radius under the flange to ⅛", also to sharpen the inside radius in the bottom, would require a press of very low tonnage and could very well be combined in the same press with the reduce operation. Thus, one operator produces a reduced and formed cup with each press stroke.

The formed cups would then be conveyed to a press of approximately 30 tons capacity for trimming and perforating. Finally, if the cups are to be furnished not-washed, they would be boxed or barrelled for shipping in the press department, with the press count on the last operation used as the shipping count. The only inspection on this cup would be by quality control.

At Bossert our presses are grouped into centers for labor and burden purposes with the largest presses, of course, carrying the largest burden from 1,700 tons to 500 tons in press center No. 51; from 500 tons to 400 tons in center No. 52; from 400 tons to 125 tons in No. 53; and from 125 tons to 50 tons in No. 54 center, which center also includes our shears.

We also have what is known as a small press department with presses from 200 tons to 20 tons; and, it is very evident that all press operations on this cup would be run in this center, which we designated as No. 63.

. . . *Continued on page 126*

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. . . Estimating, from page 125

We would now list the operations on our sheet, followed by the production center where they are to be run, and the number of pieces per hour, the direct labor rate and the burden rate, and also the time, direct labor and burden for setup of each operation. Standard setup time at Bossert in our small press department is one man, one hour for a run of 10,000 which would figure one man allowed approximately 5 hrs for 50,000 pcs with the shear setup of two men ½ hr for 50,000 pcs. Our press chart gives estimated productions for the various presses divided into three groups, light, medium, and heavy, which are used as a guide for the estimated production. The estimators also consult our standards department for rates on similar parts which we have previously run.

The operations listed for the cup would be: shear stock with a 2-man crew in No. 54 ctr.; blank and draw, 1-man in No. 63 ctr.; wash, 2-men in No. 93 ctr.; anneal, 2-men in No. 92 ctr.; pickle, a 3-man crew in No. 96 ctr.; reduce and form, 1-man in No. 63 ctr.; perforate and trim, 1-man in No. 63 ctr.; and ship, 1-man in No. 66 ctr.

For shearing we would figure the number of 6″ blanks in the sheet which is 120″ long, or 20 times 200 shear hits/hr would be 4,000 for two men.

The blank and draw production for one man, which would be run with a strip oiler, would be 700 pcs/hr as taken from our press chart and checked with figures in our standards department comparing similar parts.

We would wash about 3,000 parts/hr with a 2-man crew based on figures from standards for similar size parts.

Our annealing figures are based on 2,000 lbs/hr and as the 5⅞″ blank for the cup would weigh 0.6 lb, a 2-man crew should anneal about 3,000 pcs/hr.

A 3-man crew at Bossert should pickle just about as many as are annealed, or 3,000 pcs/hr.

The double operation of reduce and form should, according to our press chart and previous experience on similar parts from Standards, run about 700 pcs/hr, while the perforate and trim should run at 700 pcs/hr also based on the press chart and checked with Standards.

Our shipping rate is based on one man shipping a maximum of two tons/hr and with the finished part weighing approximately 0.6 lbs the rate should be approximately 6,500/hr.

The pieces per hour in hundreds are divided into the direct labor rate, also the burden rate selected from our labor and burden rate chart and the total in the first column is the production cost for direct labor per hundred, and the second column the production burden cost per hundred.

At Bossert we have a varying waste factor for various size runs which we now add to the direct labor and factory burden. This runs from 60% for a small run of 100 to 5% for a run of 10,000 or more, but is never less than 5%. This is an efficiency factor and affects the pricing of small runs mostly.

The die setting, direct labor and burden are now totaled and each column divided by the size

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of the run in hundreds (in this case 500) which is also added to the production direct labor and burden columns.

We now have the complete factory burden figure but do add 9% more to the direct labor column for "fringe benefits", which are hospitalization, paid holidays, etc.

The direct labor figures per hundred and factory burden figures per hundred are now inserted in the left side or recapitulation column immediately following the estimated tool maintenance per hundred for our small press department.

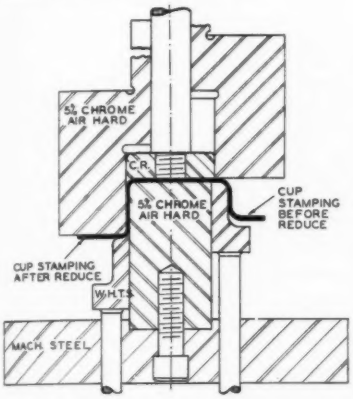

Fig. 5. Design of reduce tools used on straight side press with air cushion in the cup production.

Material handling, administrative, and selling are figured on a percentage of direct labor, and are now added to the material, tool maintenance, direct labor and factory burden per hundred for a total cost per hundred.

To this total cost is added a profit by our Sales Department, for our quoted price with the wash, anneal and pickle, also without the wash, anneal and pickle, and we would be pleased to sell 50,000 of these parts per month at the resultant price.

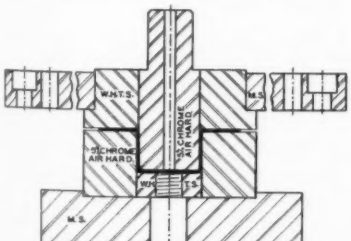

Fig. 6. Form and restrike tool designed for producing the cup.

Regarding tools for this cup, our estimators would figure a dollar value per lineal inch for the round blank and a similar value per inch for the 3 1/16" dia. draw, either straight side press with air cushion or toggle die construction shown in Figures 4 and 4A.

The reduce die, Figure 5, and form die would be figured at a dollar value per lineal inch of the drawn diameter, while the perforate and trim die, Figure 7, would also be figured on a per lineal inch basis, plus a charge for each small perforating punch and the center hole punch. We would add an amount for checking gages, which would be our price for a set of tools for this cup.

These figures, at Bossert, would be checked by our Tool Design Department and quoted to the prospective customer by our Sales Department.

Regarding the yoke, Figure 3, the estimate is first filled out as to date, customer's name and address, article, and customer's

. . . *Continued on page 128*

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. . . Estimating from page 127

number on the outside and inside of our sheet, and the material, H. R. Sheets, pickled and oiled, also noted the gauge 0.089", and the weight per square foot of 3.722, and the quantity to be figured, 50,000 or a month's supply. Then, we should lay out a paper blank (or template) for this part.

This paper blank is used for interlocking and arranging the blanking so as to get the greatest number of pieces from a sheet, quite often resorting to a double row so as to cut down the scrap as much as possible.

The material for the yoke lays out 7¼" x 100" for 70 pcs, and we would buy steel equal to six strips wide or 43½" x 100" for 420 as the most economical sheet size for this part.

This material — with a base price of $4.05 per cwt.; $ .45 for gauge and width extra; $ .15 length extra; $ .45 for pickling and oiling; and $ .36 freight — would be priced at $5.46 Utica for our estimate.

The square feet for 50,000 pcs, plus our 3% overgauge allowance, totals 3,729. This time the weight per square foot equals 13,879 lbs, which multiplied by $5.46 per cwt. equals $757.79, the total cost of stock for 50,000 pcs.

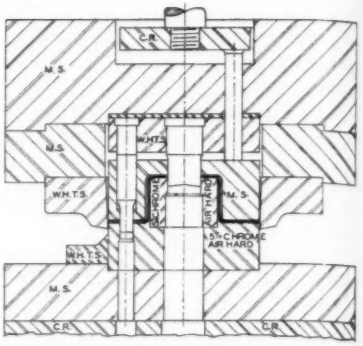

Fig. 7. Trimming and piercing tools used in the cup production.

The total of $757.79 added to the material shipping at $ .10 per hundred will total $807.79, the total cost of all material, which should be divided by 500 for the cost per hundred. This, of course, would be $1.61/C and is entered on the estimate sheet.

We are now ready to list the operations, estimated production, die setting, waste factor, and fringe percentage on our estimate sheet as soon as the operations are determined. It is apparent that, after the stock is sheared to 7¼" width, the yoke should be blanked and perforated with a compound rather than a progressive die because a compound die would lend itself to blank interlocking and double row blanking such as we have established for minimum scrap.

Forming would be done with a two station die in one press. The first station bending the wing ends and end tab, and the second station bending the wings and restriking the yoke.

The operations on the yoke should, therefore, be listed as: No. 1, shear stock to 7¼" width, 2-men No. 54 ctr.; No. 2 blank and perforate, 1-man No. 63 ctr.; No. 3, first and second form, 1-man No. 63 ctr.; and No. 4, ship, 1-man No. 66 ctr. The inspection by our quality control group is costwise included in our factory burden.

The tonnage required to blank and perforate this yoke is rather negligible — less than 20 tons — and the parts would, of course, be fabricated in our small press center, No. 63. The first operation would run on an inclined

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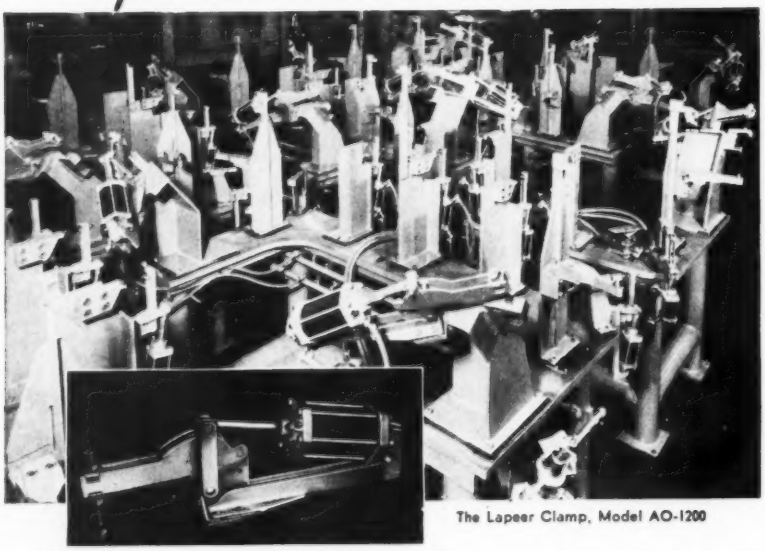

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press, air ejected into our regular tote boxes, then moved to a light fast press for forming, then boxed or barrelled for shipping in the press department using the last press operation for the shipping count.

The shearing, of course, would be done in our No. 54 center; and 70 pcs out of the sheared strip times 200 hits/hr would result in a production of 14,000 pcs/hr.

Past experience and press speeds would establish the blank and perforate at 1,200 pcs/hr in No. 63 center, and the double form at 750 pcs/hr, while the shipping should be handled at 10,000 or more per hour.

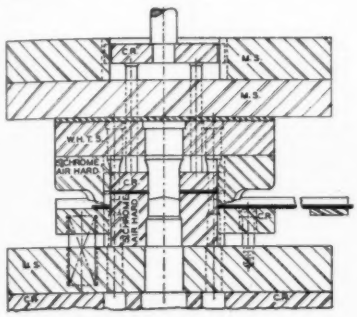

Fig. 8. Compound blank and pierce tools designed for the yoke production of 50,000 pieces per month.

Here, again, production in hundreds per hour is divided into direct labor and burden which are assigned to the center involved. We use two columns, the first direct labor per hundred, the second burden per hundred.

After our waste factor of 5% is added to both columns, and the die setting per hundred, direct labor, and burden are added,

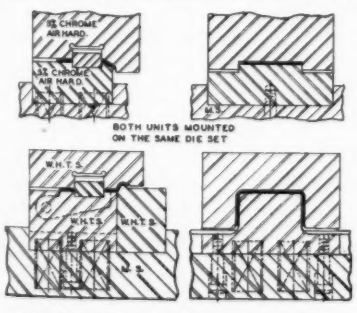

Fig. 9. Design of the 1st operation form tools for producing the yoke. Fig. 9a. Final forming tools designed for the yoke production.

we have the complete direct labor and factory burden except for our 9% to be added to the direct labor for "fringe benefits".

The direct labor figures per hundred and factory burden figures per hundred are now inserted in the left side or recapitulation column immediately following the tool maintenance which for this part should run about $ .30 per hundred.

Material handling, administrative, and selling are figured on a percentage of direct labor, and are now added to the material, tool maintenance, direct labor, and factory burden per hundred for a total cost per hundred.

Our sales would add their profit to the cost per hundred to make a quoted selling price for this yoke.

Regarding tools for the yoke, the blank and perforate, Figure 8, would be figured at a dollar value for 14 lineal inches, plus a charge for the large and the two small holes.

The two station die for forming, Figures 9 and 9A, would be estimated on a dollar value per inch, and we should have some checking gages for quality control, which would be our total tool charge for the yoke.

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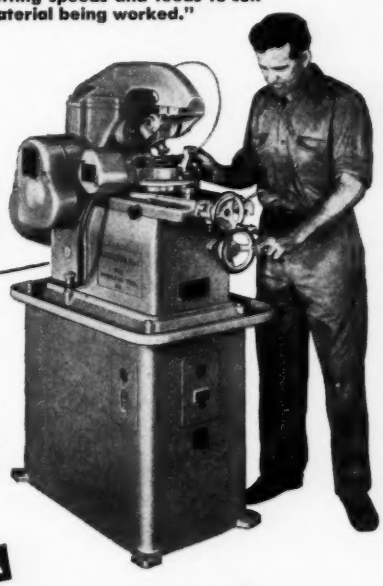

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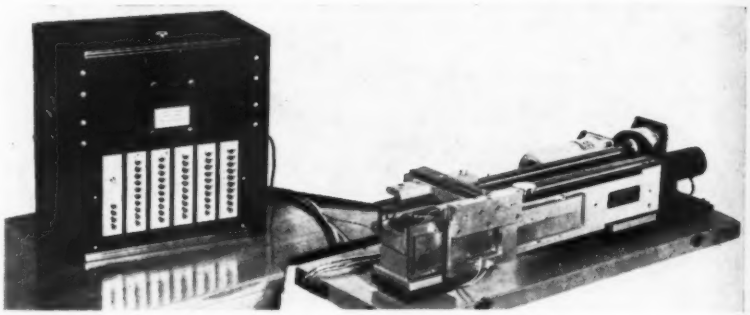
MICRO-POSITIONING FOR AUTOMATIC MACHINE TOOLS

Positioning of a machine carriage to an accuracy of 0.0001″ for each 10″ of travel can be performed automatically by a feedback system utilizing a Linear Type Inductosyn developed by Farrand Optical Co., Inc., Bronx Blvd. and E. 238th St., New York 70.

Similar to Farrand's Rotary Type Inductosyn, developed earlier, the new linear unit makes use of silver windings etched on glass plates and comprising an electronic scale 10″ long, and an electronic slider 5″ long. These are known as the data elements — one of which moves in relation to the other, providing a fine measurement of travel at any precise point. The windings, through inductive coupling, provide voltages which may be driven to a null in closed-loop servo operation.



Since there is a plurality of points which will provide a null voltage, a coarse positioning system must be used for linear distances in excess of 0.05″. The method of switching is routine; an electronic switch follows the phase-detector to switch-in a one-speed synchro at the appropriate time.

The linear Inductosyn elements are excited by a 10 kilocycle signal. Since the operating frequency is 10kc, the resultant error voltage requires conversion for control of the conventional servo amplifier and motor. A phase-detector is used to convert the 10kc signal to a d-c signal.

Although it is possible to use rotary type transmitters (resolver, or rotary Inductosyn) for positional commands, usually it is more advantageous to use digital inputs. The command voltages are set up as digital increments by means of push-buttons (as illustrated), perforated tapes, or perforated cards — using 0.1% pre-computed voltage dividers.

The example illustrated shows how a lathe can be converted to automatic carriage control, the carriage being positioned by the linear Inductosyn to an accuracy of 0.0001″ (over 12″). One inductosyn data element is fixed to the side of and below the ways. Another is movable, traversing with the carriage. The

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CIRCLE INFORM-A-GRAM KEY NO. 1301

carriage is driven automatically to any desired position along the complete length of the ways, in response to a number set on the electrical keyboard. No manual adjustments are necessary to position the carriage, it being accomplished by means of amplifiers cooperating with the data elements and a servo motor driving the carriage through a feed screw.

While the electronic scales of the linear Inductosyn are in the order of 10″ long, greater linear distances may be held in control by using additional Inductosyn elements. Thus, control can be extended from a few inches to thousands of inches.

New Techniques Used in Filming New Process

Making motion pictures of standard metal cutting processes is not a new idea. It has proved helpful in selling services and products for many concerns. Making a film on an entirely new process, however, calls for unusual techniques. Video Films, Detroit, has just completed a 20-min. sound picture in color for the Elox Corporation of Michigan to explain the theory, application, and benefits of Electrical Discharge Machining.

Elox Electrical Discharge Machining is a revolutionary concept in metalworking. It cuts shapes—once commercially impossible—into the hardest metals, including Tungsten Carbide.

Working together, Elox, Tech Agency, and Video Films have turned out a remarkable motion picture that will successfully give both technical people and laymen an understanding of what Elox Electrical Discharge Machining is, how it works, and what it has done and can do.

To accomplish this, just about every camera technique in the book was used.

Time-lapse sequences were used to show actual cuts in progress. Elox engineers set up jobs so that they could be disassembled to give the camera a cross-sectional view. A portion of the cut was made under normal conditions, then the coolant was drained from the tank, the 2-section workpiece split, and an exposure made. Then the tank was filled, another portion of the cut made and then draining and disassembling repeated. Although it took Video Films almost 8 hrs to shoot, the process of cutting a ½″ round hole through ½″ of tungsten carbide which ordinarily takes 15 min. is shown on the screen in about 45 sec. A bottomed cavity cut and a grinding operation are shown by the same technique.

Near the end of the film, examples of jobs done by Elox Electrical Discharge Machining are shown in full screen closeups. In some cases, magnification on a 6′ wide screen will be as much as 150 times. The pictures show clearly the superior finish the process produces.

Showings of the film to interested groups can be arranged by contacting the Elox Corporation, 740 N. Rochester Road, Clawson, Michigan.

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THE HANDY HAMILTON PORTABLE ELEVATING TABLE

One man can lift, lower, and transport compact, heavy loads which, without Portelvator, would require the combined strength of three or more men.

Maintains materials at proper machine feeding level.

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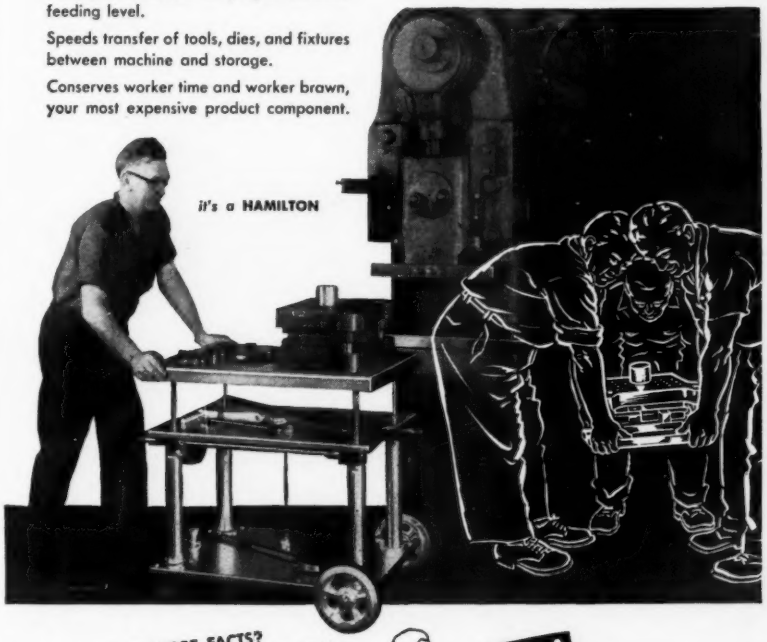
Conserves worker time and worker brawn, your most expensive product component.

Reduces injuries to workmen, and damage to tools and materials due to manual handling.

Provides a portable work bench when and where required.



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Address The Hamilton Tool Company,
832 South Ninth Street, Hamilton, Ohio

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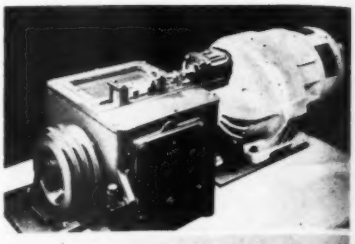
CIRCLE INFORM-A-GRAM KEY NO. 1311

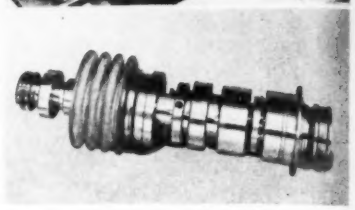
NEW SCREW MACHINE EMBODIES MANY NEEDED FEATURES

Designed to take full advantage of the productive potential offered by modern tools, the Detroit Screwmatic 750 — a single spindle, bar automatic screw machine incorporates many outstanding design features.

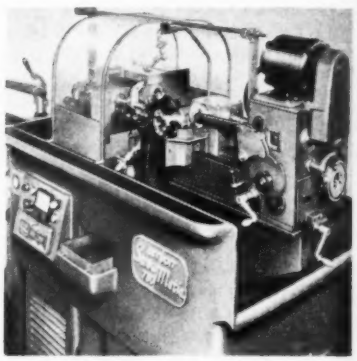
The Screwmatic machines all types of bar stock up to 0.750" dia. Through new and patented design principles, its performance promises to lower costs and increase production of short, medium, and long parts . . . of every degree of precision and complexity.

The Screwmatic's heavy-duty, 5-hp motor and advanced spindle design permit speeds sufficient to machine all types of material, using carbide tools. Spindle speeds are infinitely variable, and three different forward speeds may be employed during any cycle. All speeds are reversible, thereby eliminating need for left-hand tools.



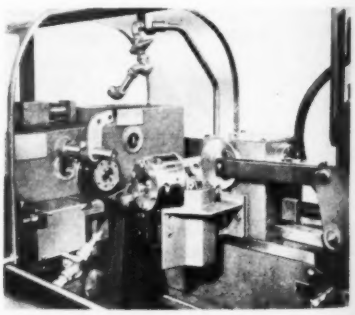


A slideable turret unit increases work length capacity by several inches. The turret unit may be positioned away from the spindle without crowding toward tools. A 3-position crank permits long, medium, and short work to be produced with equal efficiency.



Staying accuracy of closest forming tolerances is assured by the heavy-section cross slides and direct cam activation.

The spindle is mounted in precision, non-adjustable, anti-friction bearings.



One Priceless Element In Every

POPE PRECISION SPINDLE

THE *Confidence* OF ITS USER

You can have complete confidence in the anti-friction bearings POPE puts into your spindles.

They are made to new super-precision tolerances.

You can depend upon Pope Spindles for the continuous production of accurate parts, fast removal of the surplus metal and fine low micro-inch surface finishes.

POPE Spindles have radial and axial rigidity capable of properly supporting modern cutting tools on high production work.

The shafts are large for extra rigidity and have enormous excess capacity.

With the POPE SYSTEM of Grease Lubrication used successfully for thirty-four years, there is no internal radial clearance for oil film in the bearings — none is required. Instead, the bearings are permanently internally preloaded for accurate centering and positioning of the shaft.

POPE leadership in spindle design and constant PROGRESS in engineering and manufacturing reduce your tolerances and production costs.

For trouble-free operation
YOU CAN SPECIFY POPE SPINDLES WITH *Confidence*

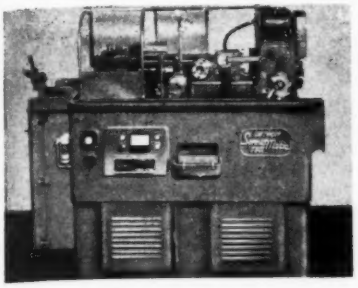
No. 103

Specify POPE PRECISION SPINDLES

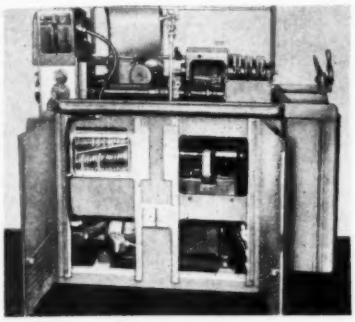
POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 1321

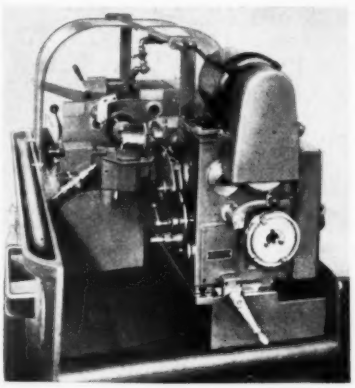
Retooling for a new job is quickly and easily accomplished. The fully visible, readily accessible lead cam does not require "cut downs" in normal operation. Tool and cam layout computations are greatly simplified. Standard tools, cams, and collets are used throughout.



The machine back opens for quick accessibility of cycle time gearing. At the right is the automatic lubrication and coolant pump drive units.



Downtime to clean chip well is eliminated on the Screwmatic. Work chips flow into a large, deep chip well with an open end, which permits chips to be removed during operation of the machine.



The Detroit Screwmatic 750 is a product of the Gear Grinding Machine Company, 3901 Christopher, Detroit 11, Michigan.

DIAMOND GROUP ELECTS OFFICERS

The Industrial Diamond Association has elected Piet Smit President of the group. Smit is associated with J. K. Smit & Sons of Murray Hill, N. J.

Other highlights of the Association's recent Tenth Convention and Annual Meeting included an evaluation of recent announcements concerning synthetic diamonds and an endorsement of the viewpoint that such diamonds on a production basis remain in the dim future. The Association also adopted a Code of Ethics and studied current problems of standardization and trade expositions.

Besides Smit, new officers are Jan Taeyaerts, Precision Diamond Tool Co., First Vice President, and Willard L. Huber, Diamond Tool Research Co., Second Vice President. Continuing as Sec.-Treas. and Executive Manager is Athos D. Leveridge.

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"Di-Lifts in Action" features helpful information on die handling problems solved with Di-Lift tables, in the tool room, press room, die storage room, etc. The booklet contains actual photos of Di-Lift tables being used at the Otis Elevator Co. Get a copy from Montgomery Tools, 7 Tichenor Lane, Newark 5, N. J.
Circle Inform-A-Gram No. B1.

Type "PL" Pipe Line Filters, designed for the removal of water, oil, dirt, and pipe scale from compressed air or gas lines, are described in a new brochure from the Air-Maze Corp., 25000 Miles Ave., Cleveland 28, Ohio. **Circle No. B2.**

Double Horizontal Disc Grinders in sizes ranging from 3 to 50-hp, which use disc wheels ranging from 12" to 72" dia, are detailed in an illustrated 16-page catalog from Besly-Welles Corp., Grinder Div'n, Beloit, Wis. Various types of work feed fixtures for use with these grinders are also described.
Circle Inform-A-Gram No. B3.

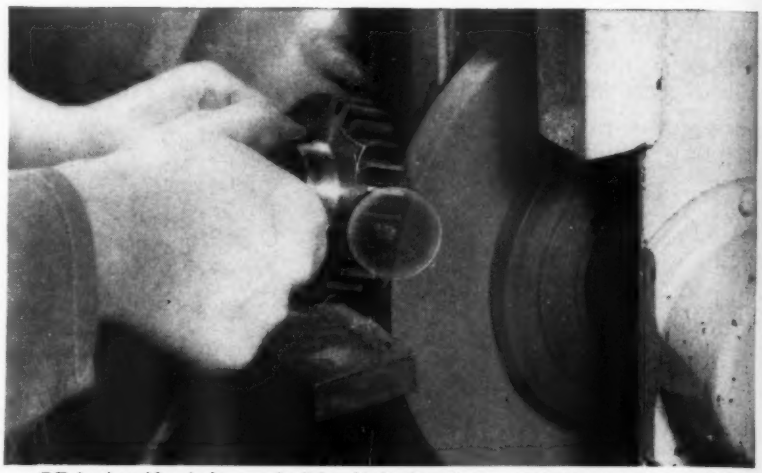
Heavy Duty D-C Contactors manufactured by Allis-Chalmers, including the new Type 522 units and control relays for steel mill and similar heavy industry applications, are described in a new bulletin. A feature of the line is the high degree of parts interchangeability, illustrated by a color code chart in the bulletin. Ask for Bulletin 14B8171A from Allis-Chalmers Mfg. Co., 1013 S. 70 St., Milwaukee, Wis., or —
Circle Inform-A-Gram No. B4.

Brass Rod Mill Products are described in a 20-page pocket-size booklet. Weight tables, specifications, and other technical data are listed on Titan free-cutting brass, commercial bronze, Ti-nic-o-sil, Tombasil, forging rods and shapes, brass wire, and Tru Shaft boat shafting in "For Your Metal Money's Worth," from Consumer Service Div'n, Titan Metal Mfg. Co., Bellefonte, Pa.
Circle Inform-A-Gram No. B5.

The "T" Lathe developed by Lodge & Shipley fills a need for facing, turning, and boring thin-walled section work of large diameter and short length. It is radically different from conventional lathe types and obsoletes the use of cumbersome conventional machines by introducing a bed with the carriage-carrying section at right angles to the lathe centerline. Ask for Bulletin No. 215, The Lodge & Shipley Co., Cincinnati 25, Ohio.
Circle Inform-A-Gram No. B6.

A System for Taking Nearly Simultaneous Temperature Readings at several points on a single-centrally-located pyrometer is outlined by West Instrument Corp., Chicago 22, in a new specification sheet. The multi-point high resistance indicating pyrometers and thermocouple switches which make up the system are fully described.
Circle Inform-A-Gram No. B7.

Polishing Flat Stock has become an accepted procedure for many products, and compact "Micro Polish" units have been developed for high production sheet grinding and polishing. Details on the machines and methods are outlined in "Micro Polish — An Important Part of Your Production," from The Murray-Way Corp., Box 180, Birmingham, Mich.
Circle Inform-A-Gram No. B8.



BF A universal favorite for removing light welds, breaking edges on machined work, deburring, taking off flash from plastic parts and many other light portable and bench grinding operations. To be used on periphery only.

The jobs they do! The money they save!

Norton Reinforced Wheels add the "TOUCH of GOLD"

to countless everyday grinding jobs

With Norton Reinforced Wheels you get extra-long service life, exceptional strength and fast, cool, trouble-free grinding — the Norton-engineered "Touch of Gold" that saves you money in the widest range of routine grinding jobs, from light deburring to heavy cutting-off.

To this top grinding performance Norton Reinforced Wheels add a wide margin of safety. All four are resinoid bonded and reinforced by layers of tough fabric molded into them. As follows:

BF — *Semi-flexible straight wheel, cotton fabric reinforcement. Also available in mounted wheels and points and hand sticks.*

BN — *Straight wheel with glass cloth reinforcement. Primarily a cut-off wheel, its rough, knurled sides provide additional cutting action.*

BD — *Rigid hub-type. Glass cloth and Nylon reinforcement. Designed especially for right angle portables and disc sanders.*

BFR — *Semi-flexible hub-type. Cotton fabric and Nylon reinforcement.*

See Your Norton Distributor

for a demonstration of Norton Reinforced Wheels in your shop. Ask him for the big new catalog on Reinforced Wheels. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

PREVIEWS

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TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Protection for Threaded Ends of parts, pipe, or tubing during finishing, assembly, storage, or transit is provided by a line of caps and plugs announced by Ray A. Scharer & Co., 3000 E. Grand Blvd., Detroit 2. Catalog No. 55-1 covers dimensional information on five types of rubber and two types of plastic Shurclose caps and plugs.
Circle Inform-A-Gram No. B9.

The Dynamic Eddy-Current Brake's design provides an efficient frictionless brake in a wide range of torque capacities and operating speeds to satisfy most machine tool requirements. Descriptive material and specifications are given for liquid and air-cooled brakes in Bulletin BR1 from Dynamic Div'n, Eaton Mfg. Co., Kenosha, Wis.
Circle Inform-A-Gram No. B10.

The Stamping and Molding Services, and products manufactured by The Dayton Rogers Mfg. Co., are illustrated in a brochure, "For the Best Specify. . . ." Products included are die cushions, shell trimmers, hydraulic overload Pitmans for punch presses, spacing collars, and layout fluid. Get your copy from Dayton Rogers Mfg. Co., 2824 13 Ave., Minneapolis 7, Minn., or —
Circle Inform-A-Gram No. B11.

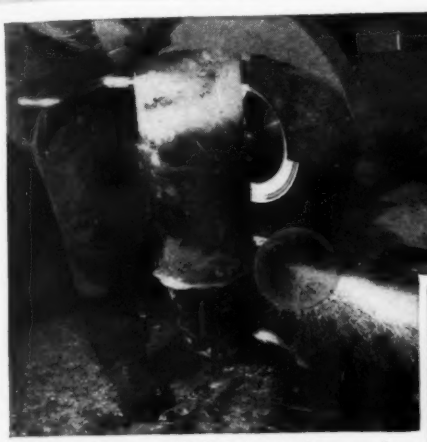
Micro Gage Comparator Charts eliminate operator indecision and speed inspection of close tolerances by means of specially marked lines on the charts. Five different types of Micro Gage lines are described in a recently published bulletin from Optical Gaging Products Inc., 26 Forbes St., Rochester 11, N. Y.
Circle Inform-A-Gram No. B12.

Nicrobraz Stainless Steel Brazing Alloy — its properties and applications — is the subject of a new catalog from Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich. Typical curves chart shear strength, ductility, tensile strength as brazed, and tensile strength after aging for the Nicrobraz alloy, compared with copper S-590 stainless steel base metal and a high temperature silver brazing alloy.
Circle Inform-A-Gram No. B13.

"Brinalloy" Seats and Discs in the LQ600 valve are so resistant to wear and corrosion that they can be fused permanently to the valve for its entire service life. This feature and the valve's streamlined design are covered in Circular 602 from The Lunkenheimer Co., Cincinnati 14, Ohio, or —
Circle Inform-A-Gram No. B14.

Solid Titanium Carbide Thread Ring Gages in the solid, round design cannot be adjusted to pass incorrect work. They permit working to and holding very close tolerances. A bulletin from the manufacturer, the Pipe Machinery Co., 29100 Lakeland Blvd., Wickliffe, Ohio, describes these gages.
Circle Inform-A-Gram No. B15.

"Geared for Research, Design, and Production," a 24-page booklet just issued by New Process Gear Corp., 500 Plum St., Syracuse, N. Y., describes the company's facilities for precision metalworking production. Illustrated are various engineering services available for the first time to manufacturers requiring contract production of close-tolerance components or complete units.
Circle Inform-A-Gram No. B16.



BN The preferred cut-off wheel for non-ferrous and non-metallic jobs. Also excellent for cutting wire rope, slotting rails, tuck pointing etc. Used on swing-frame and stationary type cutting-off machines, large and small portables.

BD A specialist in heavier stock removal, such as welds on fabricated work, smoothing flame-cut edges, cleaning between teeth of gear castings, etc. — also for slotting, notching and cutting-off.

BF Mounted Wheels and Points have the same strong laminated construction as the larger BF wheels. For polishing die cavities, chamfering, Brinell spotting, etc. For hand finishing, use BF sticks.

BFR Excels at the lighter portable jobs, such as rust and scale removal, light weld grinding, scarfing and beveling, blending contours, notching gates and risers.

W-1637

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BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

CIRCLE INFORM-A-GRAM KEY NO. 1341

See Your Plant in "Two-D" with Repro-Templets' complete plant layout service. Descriptions of the company's services are explained with a scaled plant layout in a new brochure from Repro-Templets Inc., Oakmont, Pa.
Circle Inform-A-Gram No. B17.

Some of the Weldments, Fabrications, and special machinery made by Glasby are pictured in a new folder. Over a dozen examples are shown. Get your copy from J. P. Glasby Mfg. Co., Inc., 67 Montgomery St., Belleville 9, N. J., or —
Circle Inform-A-Gram No. B18.

"How to Simplify and Save" lists six steps to follow in streamlining a plant's lubrication program and briefly describes six lubricants that will take care of all the plant's lubrication needs. The booklet is from The Pure Oil Co., Consumer Sales Promotions, 35 E. Wacker Dr., Chicago 1, Ill., or —
Circle Inform-A-Gram No. B19.

Lufkin's New General Catalog No. 14 describes and illustrates the company's lines of precision tools and tapes and rules. Get your copy from Lufkin Rule Co., Saginaw, Mich.
Circle Inform-A-Gram No. B20.

133
STANDARD SIZES
precision or oversized

Sizes range from 3/8" to 6" in length—1/8" to 1" in diameter. Precision pins are hardened and ground to .0002" or .001" over nominal diameter—oversized from .002" to .005".

Acme Pins are case hardened to 60-62 Rockwell "C" scale and core hardened to 36-38. These pins will break before bending or mushrooming—preventing misalignment or breaking of doweled parts. A special lubricant is used on pins to prevent scoring when being driven in and out of holes.

Order from your distributor—or write for Acme Dowel Pin folder and name of distributor nearest you.

ACME INDUSTRIAL COMPANY
206 N. LAFLIN STREET, CHICAGO 7, ILLINOIS

Manufacturers of standard dowel pins • Chamfer micrometer gages • Drill jig bushings • Portable bench centers • Roughness comparison specimens • Hardened and ground parts manufactured to order

CIRCLE INFORM-A-GRAM KEY NO. 1361

The Complete-Line Bulletin being issued by Kling Bros. consists of only 6-pages and illustrates and describes the basic Kling models that represent over 50 different machines which handle more than a score of metal fabricating operations, such as

high speed friction saws; combination shear, punch, and coper; vertical, horizontal, and universal punches; and angle and plate bending rolls. Ask for Bulletin 100 from Kling Bros. Engineering Works, 1320 N. Kostner Ave., Chicago 51, Ill., or — **Circle Inform-A-Gram No. B21.**

The "Burraway" Deburring and Chamfering Tools catalog contains descriptions of the tools and illustrated information on their applications, speeds and feeds, and dimensions for power feed applications. A copy is available from Cogsdill Tool Products, Inc., 12980 W. 8-Mile Rd., Oak Park 37, Mich., or —
Circle Inform-A-Gram No. B22.

High Speed Electric Hand Tools in the Precise Products Corp. line include "grinder millers" and power quills capable of speeds up to 45,000 rpm. These tools, plus high speed lathes and milling machines and accessories, are described in new general catalog FGH-2 from Precise Products Corp., 1328-30 Clark St., Racine, Wis., or —
Circle Inform-A-Gram No. B23.

"Modern Methods of Joining Metals" uses case histories and photographs to describe oxy-acetylene welding and soldering, Unionmelt welding, sigma welding, and Heliarc welding. The operations involved in building chemical storage tanks, stainless steel railroad cars, piping, "iron lungs," and many other products are graphically pictured and explained in the booklet from Linde Air Products Co., 30 E. 42 St., New York 17, or —
Circle Inform-A-Gram No. B24.

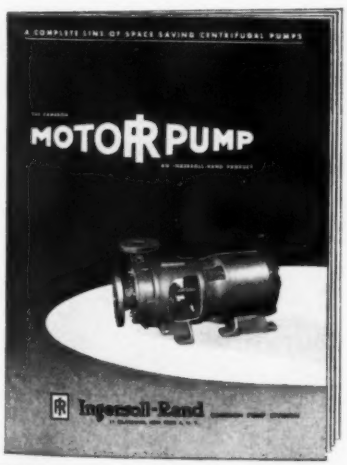
"Inductosyn," a new electronic micro positioning device for automatic control is available in two models, for rotary or linear positioning. A 4-page bulletin from Farrand Optical Co., Inc., Bronx Blvd., & E. 238 St., New York 70, explains the operation of the units and lists typical applications.
Circle Inform-A-Gram No. B25.

Applications for Fused Quartz Radiant Heaters in industry are described in a new 4-page folder. Illustrated are the various shapes and sizes and applications for the efficient fused quartz heaters to baking and drying jobs. On-the-job photos and detailed line drawings give information on installing and operating the units. Cleveland Process Co., 1967 E. 57 St., Cleveland 3, Ohio.
Circle Inform-A-Gram No. B26.

L & J Open Back Inclinable Punch Presses with capacities from 8 to 90-tons are the subject of Bulletin No. L-12 from L & J Press Corp., Ren St. & Sterling Ave., Elkhart, Ind. Complete specifications and construction notes are included in the 8-page bulletin.
Circle Inform-A-Gram No. B27.

New Holding Capacities, sizes, and BTU inputs for the soft metal reverberatory furnace of the dry hearth type are topics covered in a new bulletin from Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill. Informative sketches illustrate methods for melting aluminum for casting work. Bulletin C-80.
Circle Inform-A-Gram No. B28.

The New Motorpump Bulletin from Ingersoll-Rand covers the company's entire line of close-coupled Motorpumps, from ¼ to 75-hp sizes, for delivery of 5 to 2,800 gal per min.



Motorpump features, applications, and dimensions are included in Form 7093-E from Ingersoll-Rand, 11 Broadway, New York 4, N. Y.
Circle Inform-A-Gram No. B29.

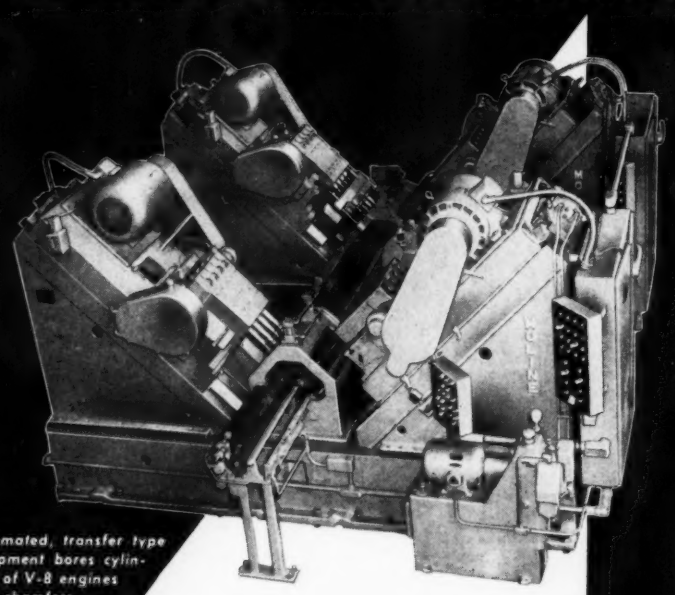
Lamina Shows Its Complete, Modern Facilities and methods and illustrates progressive, lamination, and gear dies in colorful 20-page brochure No. 55. Get your copy from Lamina Dies & Tools, Inc., Box 31, Royal Oak, Mich., or —
Circle Inform-A-Gram No. B30.

Wedlin Lead Screws, feed screws, and elevating screws are now hardened and ground for greater accuracy. A folder from Wedlin Corp., Box 37, Detroit 20, Mich., pictures the lead screws and tells how to order from your specifications.
Circle Inform-A-Gram No. B31.

The Master-Monotrol 10" tilting arbor saw is described in a brochure now available from Boice-Crane Co., 963 W. Central Ave., Toledo, Ohio. The saw features extreme accuracy, high capacity, simplified operation, and several new safety factors.
Circle Inform-A-Gram No. B32.

Reliance Rings, Spring Lock Washers, Hoz-Fas-Ners, and "thread-cutting" springtites and sems and Eaton springtites, for innumerable fastening applications, are described in a catalog from Reliance Div'n, Eaton Mfg. Co., Massillon, Ohio.
Circle Inform-A-Gram No. B33.

For Greater...
PRODUCTION • EFFICIENCY • SAVINGS



Automated, transfer type equipment bores cylinders of V-8 engines and chamfers both ends of bores.

Use an individually designed "Hole-Hog" Machine Tool for such jobs as:

- **Multi-Spindle Boring**
- **Single and Multi-Spindle Honing**
- **Straight Line Multi-Drilling**
- **Adjustable Spindle Drilling**
- **Vertical and Way-Type Fixed Center Drilling, Boring and Tapping**
- **Special Multiple Operation Machine Tools**

Over 50 years of Machine Tool Engineering experience is at your service. Tell us your particular problem.

Representatives in principal cities.

MOLINE TOOL CO. HOLE-HOG MOLINE, ILLINOIS

MOLINE TOOL COMPANY
100 20TH STREET MOLINE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1371

Precision Magnetic Adjustable V-Blocks are the subject of literature now available from Anton Machine Works, 1226 Flushing Ave., Brooklyn 37, N. Y. The accurate, self-contained units can be used for layout work, as portable magnetic chucks, in every department from the toolroom to production lines.
Circle Inform-A-Gram No. B34.

The Honan-Crane Multi-Cartridge Oil Filters introduced by Houdaille-Hershey of Ind., Inc., are recommended for virtually any operation where oil can be by-passed. Each of the six types of cartridge refills is designed for a specialized filtering job, yet all are interchangeable. Equipment Bulletin 201 from Filtration Div'n, Houdaille-Hershey of Ind., Inc., 248 Superior Ave., Lebanon, Ind.
Circle Inform-A-Gram No. B35.

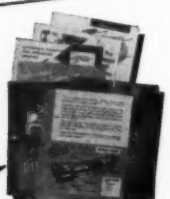
No. 460 Continuous Power Conveyor was developed in response to the demand for a light-weight, extremely flexible conveyor. Numerous uses for the No. 460 are illustrated in catalog No. A-96 from Richards-Wilcox Mfg. Co., Aurora, Ill., along with specifications.
Circle Inform-A-Gram No. B36.

INCREASED PRODUCTION IN LESS TIME, AT LESS COST DEMANDS DICKERMAN AUTOMATIC STOCK FEEDS!

AUTOMATION BEGINS HERE!

The minute Dickerman feeds start moving stock into your dies, you're on the way to AUTOMATION — and the sensational production benefits this new technique affords. Every Dickerman Hitch Feed, Die Feed and Rol-Di-Feed is engineered to speed production at any rate the tooling will withstand — and built to outlast the die itself! Twelve standard Dickerman feeds are available, and each performs faithfully, precisely —hour after hour, month after month. When you think of AUTOMATION, think of DICKERMAN — and the dependable Dickerman line of automatic press feeds that afford increased production output and economy.

PLANNING AUTOMATION? Send for literature on the complete Dickerman line.



Dickerman

H. E. DICKERMAN MFG. CO.

324-252 Albany St. • Springfield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1381

Super Precision Spindles for grinding, boring, drilling, milling, routing, and other kinds of workheads are featured in Catalog No. 20 from The

Standard Electrical Tool Co., Mt. Hope & Sixth St., Cincinnati, Ohio. Included are details on machine tool attachments, slides, feeds, traverse, and tables. **Circle No. B37.**

All Services from designing, engineering, and building special machinery, dies, and tools to heat treating, chrome plating, and the redesign of old machines are undertaken by City Tool & Die. An illustrated brochure shows the company's facilities in operation. City Tool & Die Co., Inc., 1302 E. Washington St., Muncie, Ind., or —
Circle Inform-A-Gram No. B38.

"The Care and Maintenance of Diamond Tools" is amply described in a bulletin of that name from J. K. Smit & Sons, Inc., Murray Hills, N. J. The booklet is written to help the men in the shop and careful attention to the dressing and truing of diamond grinding wheels is stressed.
Circle Inform-A-Gram No. B39.

Technical Aspects and New Applications for the Metalphoto process of photographic reproduction on photosensitive aluminum plates are now detailed in a report from the Metalphoto Corp., 2903 E. 79 St., Cleveland 4, Ohio. Other topics covered include exposing and developing the plates, their adaptation for color and three-dimensional effect, plus general properties.
Circle Inform-A-Gram No. B40.

Newly Named Brubaker Electronics, Inc., formerly Brubaker Mfg. Co., Inc., shows its facilities and services in the research, development, and production of electronic equipment, in a new bulletin. Write to Brubaker Electronics, Inc., 9151 Exposition Dr., Los Angeles 34, Calif., or — **Circle Inform-A-Gram No. B41.**

Small, Rugged Electric Tachometers for practically any production control, speed indicating, or checking application are fully described in a new 20-page bulletin (No. 540) from Electric Tachometer Corp., Philadelphia 3, Pa. Included are 10 Model M1200 magneto types with accessories for connecting magnetos to the drive source through direct coupling, pulleys, chain-and-sprockets, spur gears, or friction contact.
Circle Inform-A-Gram No. B42.

The Uses and Merits of Subland Tools are illustrated and described in a new bulletin from Detroit Reamer & Tool Co., 2830 E. 7-Mile Rd., Detroit 34. Comparative advantages of subland tools over standard and step drills are included to provide users with a basis for selection.
Circle Inform-A-Gram No. B43.

New Germanium Rectifiers developed by Rapid Electric Co., 2881 Middletown Rd., New York 61, offer 95% efficiency at full load. They are available in several models from 300 to 50,000 amps D-C output. "Presenting Germanium Rectifiers" gives details.
Circle Inform-A-Gram No. B44.

Workholding Equipment and Jig and Fixture Components are illustrated in a new 64-page catalog from Jergens Tool Specialty Co., 712 E. 163 St., Cleveland. Complete engineering data on thousands of in-stock sizes of chuck jaw blanks, handles, knobs, wheels, clamp assemblies, and components is contained in the catalog and part sizes are specified to the finest detail.
Circle Inform-A-Gram No. B45.

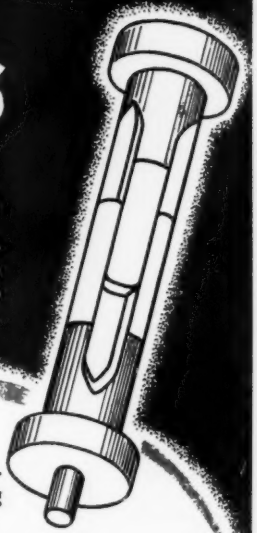
"The Homocarb Method with Microcarb Atmosphere Control for Heat Treatment of Steels" tells how Homocarb furnaces with Microcarb control are being used for case carburizing, carbon restoration, homogeneous carburizing, and hardening of steel products on a mass production basis. Installation photos and case histories are included in Catalog TD4-620(1) from Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa., or — **Circle Inform-A-Gram No. B46.**

"Machine Screws and Specialties" is both title and subject of illustrated Catalog No. 21 from The Progressive Mfg. Co., Torrington, Conn. All standard types are pictured and described and special sections deal with the right way to measure machine screws and with nut specifications, weights, and thread dimensions.
Circle Inform-A-Gram No. B47.

The Progress of One of America's Oldest Contract Tool and die shops is presented dramatically in an illustrated brochure published by August W. Holmberg & Co., Inc., 133-31 39 St., Flushing, N. Y. Pictures decades old illustrate the Holmberg story, and numerous photos by **LIFE** photographer William Vandivert show the company's modern facilities in "Tool Up and Stamp It at Holmberg."
Circle No. B48.

"Lead Treated Steels" describes the characteristics and properties of the alloys, with case history information supplementing Copperweld Steel's claims of freer machining, better finishes, longer tool life, at higher feeds and speeds for these metals. Copperweld Steel Co., Warren, Ohio.
Circle Inform-A-Gram No. B49.

For over 15 years
Durable Patented
PUNCHES
(with inter-mesh sleeves)
HAVE SOLVED PRODUCTION PROBLEMS NOT POSSIBLE WITH ORDINARY PUNCHES!
The Durable Patent Punch is mounted into 2 intermeshed sleeves which give 100% support. So the Punch CANNOT buckle. This permits perforation into metal many times thicker than diameter of hole.



HERE'S WHAT IT DOES FOR YOU!
1. LONGER LIFE: Punches vertically lapped and electro-coated. Makes for easier stripping—retards fireing or galling—gives longer life.
2. POSITIVE ALIGNMENT: Punch is completely confined and can't shift off center.
3. ELIMINATES DRILLING HOLES: Where hole diameter is less than metal thickness, Durable Punches will EASILY perforate up to triple usual metal thickness.
4. PUNCHES HOLES THRU RODS: Perforation easily accomplished with Durable principle.
5. EASY PUNCH CHANGEOVER: No pressing in or out—punch slips into mounting sleeves—quick as a wink.

DEPEND ON DURABLE TO SOLVE YOUR PUNCH PROBLEMS
We invite questions—without obligation. Write today—present your problem and we'll gladly acquaint you with facts derived from years of experience.
IF IT'S DURABLE IT'S DEPENDABLE
Patented and made exclusively by
DURABLE PUNCH & DIE COMPANY
1214 W. Madison Street, Chicago 7, Illinois
CIRCLE INFORM-A-GRAM KEY NO. 1391

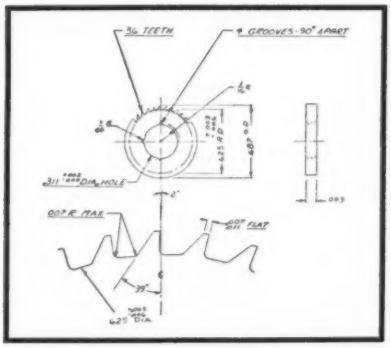
A New Line of Precision Surface Plates made of cast iron are described in a bulletin from Durant Tool Supply Co., 136 S. Water St., Providence, R. I. Standard stock sizes range from 8" x 10" to 18" x 24", and special sizes also are available. **Circle Inform-A-Gram No. B50.**

Hi-Shear Rivets — why, how, and where they are used — and tools for their application are featured in the new Seventh Edition of the Hi-Shear Rivet Tool Catalog. A section on Hi-Torque tools (accessories for air power tools for Hi-Shear riveting) has been revised completely. Get a copy from The Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., Los Angeles 45, Calif., or — **Circle Inform-A-Gram No. B51.**

"Colloidal Graphite for Surface Coatings and Impregnation," a revised 6-page bulletin, has just been published by Acheson Colloids Co., Port Huron, Mich. Special dispersions of 'dag' colloidal graphite for surface coating and appropriate methods of application are presented, in addition to many uses of the compound. Ask for Bulletin 435, or — **Circle Inform-A-Gram No. B52.**

Gaertner OPTICAL INSTRUMENTATION

to measure and check parts like this



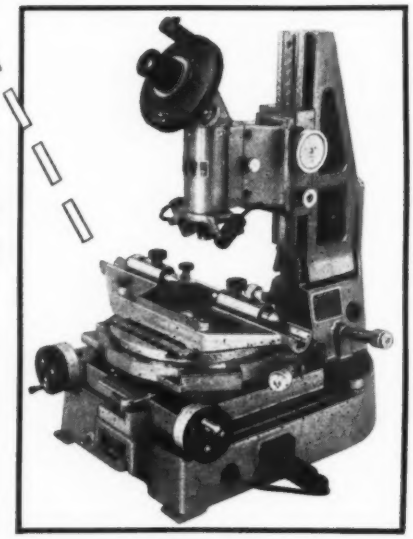
Use the Gaertner Toolmakers' Microscope

FEATURING

Range	2" x 4"
Reading to	.0001"
Stage Rotation	360°
Reading to	1 minute
Magnification	30X
Protractor Ocular	

ACCESSORIES

Templet Ocular Head
Radius and Thread Templets
Camera Attachment
Magnification 10X to 100X



M2001ARS

Write for Bulletin No. 147-50

The Gaertner Scientific Corporation

1242 Wrightwood Ave., Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1401

The Revision of Tap Standards as adopted by the Metal Cutting Tool Institute are explained in the new Pratt & Whitney tap catalog and a conversion table shows the taps to

be supplied where old designations are specified. The 25-page catalog, Bulletin No. T-583, illustrates and describes the ground thread taps manufactured by Pratt & Whitney, W. Hartford 1, Conn.
Circle Inform-A-Gram No. B53.

There Are Three Basic Types of Feed Mechanisms for use on double horizontal disc grinders manufactured by Besley-Welles Corp., — oscillating, rotary, and thru feed. All models have exclusive "Sealed Spindle Quill" construction. These points and many others are pictured and explained in 16-page Bulletin No. 200 from Besly-Welles Corp., Grinder Div'n, Beloit, Wis. **Circle No. B54.**

Rapid Production Line Testing of Welds, bonds, or other low resistance paths by a non-destructive "Go-No Go" method is accomplished with Shallcross low resistance test sets. Ten highly accurate milliohmeters and microhmeters for measuring low resistances are described in Engineering Bulletin L-39 from Shallcross Mfg. Co., Collingdale, Pa.
Circle Inform-A-Gram No. B55.

The "Hole Story" on versatile model OA radial drills is covered in an illustrated folder now available from The Carlton Machine Tool Co., Cincinnati 25, Ohio. OA radials for drilling, tapping, and boring drill holes as small as ⅛" and tap holes as large as 1½".
Circle Inform-A-Gram No. B56.

Full Details and Plant Specifications and facilities of O & M Machine Co., Inc., 7421 E. Slauson Ave., Los Angeles 22, Calif., are covered in a new 24-page brochure. Illustrated is the special production equipment designed and built by O & M; duplicating equipment; heavy and light machine shops; aircraft traveling cranes; engineering, tooling, and testing facilities; and current production samples.
Circle Inform-A-Gram No. B57.

"Opportunities Through Automation" shows in large pictures and informative captions, examples of standard, transfer, and special machines equipped with mechanisms for automatic loading and unloading of workpieces. The brochure stresses that automation need not be restricted to the very large plants. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Circle Inform-A-Gram No. B58.

"Magniveyors" magnetically convey any shape of ferrous material, in any direction, at any angle. The units require only a fraction of the space used for conventional inclined conveyor systems and are easily integrated with existing systems or can be used separately. Bulletin No. 1103-4 from Magnetic Engineering & Mfg. Co., Clifton, N. J., describes the units.
Circle Inform-A-Gram No. B59.

The "Cerco" Stak Pal materials handling system permits arranging standard component parts into innumerable sizes and layouts to provide adequate storage space for anything from extremely small parts in bins to heavy, bulky axles and motors in individual racks. Get a picture of the Stak Pal method in a bulletin from C. E. Robinson Co., 220 Colburn Ave., Joliet, Ill.
Circle Inform-A-Gram No. B60.

Five Sizes of Landroll Thread Rolling Attachments are the subject of Bulletin No. G-96-1 from Landis Machine Co., Waynesboro, Pa. The units' perfect helix agreement eliminates thread imperfections and enables the rolling of course pitch threads to class 4 tolerances. Their adjustment system permits accommodation of a large variety of sizes and pitches.
Circle Inform-A-Gram No. B61.

The Tri-D Milling Head is designed for use with almost any make of horizontal milling machine and some vertical mills. It features lateral adjustment, rotary movement, and angular adjustment to produce almost any geometric shape—straight lines, radii, and angles using simple arithmetic. Bulletin No. TD-10 from Kearney & Trecker Corp., Milwaukee 14, Wis.
Circle Inform-A-Gram No. B62.

Cy-Co-Trol Tool Control Units with Cyclemeters, installed beside machine tool units, offer positive control of cutting tool life and orderly storage for two extra sets of tools. The cyclemeters indicate the stage of tool life and can automatically stop the machine when tools need to be changed. Royal Design & Mfg., Inc., 4133 E. 10-Mile Rd., Centerline, Mich., will supply a bulletin, or —
Circle Inform-A-Gram No. B63.

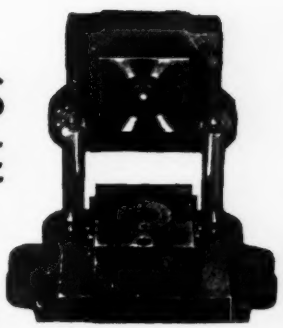
The Multi-Purpose Tool being manufactured by Rolett has six precision cutting edges for scraping, sharpening, routing, carving, marking, or use as a hand-held lathe tool. Additional information is contained in literature from Rolett Tools & Die Mfg. Co., 1823 Fifth St., Berkeley, Calif.
Circle Inform-A-Gram No. B64.

Automatic Mask Washing Machines are illustrated and described in a bulletin from Conforming Matrix Corp., 416 Factories Bldg., Toledo 2, Ohio. The machines remove accumulated paint from both sides of the masks with a high pressure spray system, eliminating the dangers of solvent-washing open tanks or pans containing highly volatile solvents.
Circle Inform-A-Gram No. B65.

Flamatic Units enable manufacturers to apply heat in any desired amount in exactly the right place. A wide variety of parts can be processed with a choice of fuel gases. Complete descriptive material is included in Bulletin M-1861 from Process Machinery Div'n, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. **Inform-A-Gram No. B66.**

"a MUST wherever WASHERS are made!"

HOVIS
OFFERS YOU THIS SIMPLE, UP-TO-THE MINUTE METHOD



There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.

Made in 5 sizes:
¾"—1 ½"—2 ½"—4"—6"

Write for literature

HOVIS SCREWLOCK COMPANY
8100 E. NINE MILE ROAD VAN DYKE, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit
CIRCLE INFORM-A-GRAM KEY NO. 1411

"How Would You Tool-Up To Make An Egg?"—The Koldflo process described in a bulletin of that title, makes one-piece finished parts in one process — by cold extrusion. Numerous photos and illustrated case history studies describe this process in the second edition of the booklet from Mullins Mfg. Corp., Warren, Ohio, or — **Circle No. B67.**

The Heavy Duty Version of the Small Electric Hoist, the CM Lodestar, features maintenance-free operation, versatile suspension, light weight, low headroom requirements, shockproof pushbutton stations, and high economy. For a full description of the Lodestar units with ⅛ to 1 ton capacities, ask for Bulletin No. 158 from Chisholm-Moore Hoist Div'n, Columbus McKinnon Chain Corp., Tonawanda, N. Y. **Circle Inform-A-Gram No. B68.**

"Hints on Heat Treating Tool Steel" is written to help small shops that do not have trained metallurgists but want to do their own heat treating. The folder describes terms and procedures and lists general rules concerning the use and operation of electric heat treating furnaces or ovens. Copies are available from K. H. Huppert Co., 6839 Cottage Grove Ave., Chicago 37, or — **Circle Inform-A-Gram No. B69.**

with a NORBIDE® Dressing Stick

JUST a couple of passes with a handy NORBIDE Dressing Stick is all it takes to clean up a wheel face, dress a radius or groove or touch up a cup or saucer wheel. And with this conveniently sized stick you can see more of the wheel and thus avoid costly overdressing.

A NORBIDE Stick of boron carbide—the hardest material made by man—will outlast hundreds of ordinary abrasive sticks. You'll find it will greatly reduce dressing dust nuisance also.

Order a supply of these cost-cutting sticks from your local Norton distributor or write for Form 1567 giving more details.

NORTON COMPANY, 47 New Bond Street, Worcester 6, Mass.

NORTON® BORON CARBIDE

Next to the diamond in hardness— available at a fraction of diamond cost

CIRCLE INFORM-A-GRAM KEY NO. 1421

The Industrial Slides described in Grant Pulley & Hardware's 6-page folder are essentially drawer slides designed to serve specialized functions — for easy access to electronic equipment, for instance. The folder lists the scope, general functions, and applications of the company's industrial slides. Grant Pulley & Hardware Corp., 31-85 Whitestone Pkwy, Flushing 54, N. Y. **Circle Inform-A-Gram No. B70.**

A Toolholder Catalog (V-R-435B) offering for the first time style RBR-RBL toolholders for "Throw-Away" carbide blanks and round 1½" round long carbide inserts has been published by Vascoloy-Ramet Corp., Waukegan, Ill. In addition, six other styles are shown for straight and lead angle turning and facing and plunge turning with "Throw-Away" inserts, "half-length" inserts, and 1½" inserts. **Circle Inform-A-Gram No. B71.**

Rigid Drive Shaft, Hydraulic Actuation, Double Cone Type Expansion, and shell or plastic-mounted stones are some of the construction features of the precision "Size Control" hones described in a bulletin from Jes-Cal Co., 13500 E. Nine-Mile Rd., E. Detroit, Mich. **Circle Inform-A-Gram No. B72.**

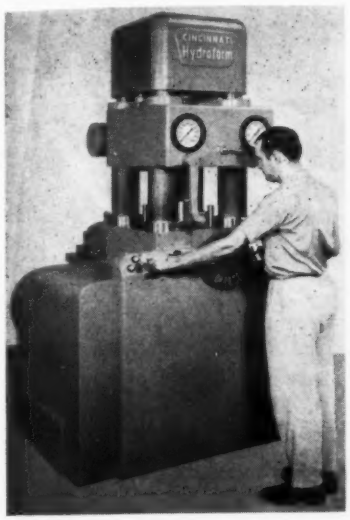
New No. 0 Centerless Grinder developed by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, is especially designed for the wide range of metallic and non-metallic parts up to ½" dia. It embodies all the outstanding features of the company's larger centerless grinding machines, including the trouble-free "Filmatic" spindle bearings. Publication No. G-640 describes it. **Circle Inform-A-Gram No. B73.**

Talide Metal is a tungsten carbide being manufactured into cutting tools and tips and dies by Metal Carbides Corp., Youngstown 7, Ohio.

Catalog No. 55-G shows the tools and dies and other products available from the company and gives helpful information on the care and use of Talide Metal. **Circle Inform-A-Gram No. B74.**

SMALLER HYDROFORM OFFERS SAVINGS

Experimental, short, and medium production runs of small size, deep drawn and formed parts can now be made without prohibitive tool costs, long lead time. A new smaller-size Hydroform provides this advantage.



Hydroforming embodies the use of a male punch . . . and a flexible die member backed up by hydraulic oil pressure, which may be accurately controlled up to 15,000 psi. The flexible die member not only eliminates the most costly element of a normal die set, but increases forming efficiency so that difficult parts are made in fewer operations.

The new 8" machine will form parts from sheet metal blanks up to 8" dia., with a maximum draw depth of 5". Practically all sheet metals in gauges up to ¼" steel can be drawn. The maximum machine operating rate is 200 cycles/hr.

ULTRASONIC CHECK ON PIPE WALLS

Accurate wall thickness measurements in heretofore inaccessible pipe sections are shown here being performed by the use of a portable Reflectoscope at the Power Piping and Sprinkler Division plant of the Blaw-Knox Company, Pittsburgh, piping fabricators and erectors.

The ultrasonic unit tests pipe wall thickness to within 0.005" at bends which ordinarily are difficult to check. The machine also is used to detect internal flaws in the metal as such flaws cause a wave reflection which shows on the scope set in the front of the instrument.

The lightweight Reflectoscope, easily carried by two men to various parts of the shop, is used extensively at Blaw-Knox Company before formed work passes final approval.

RING PUNCHES DIES

NEW CATALOG!
Just off the press!

MANY SHAPES and Types

Round
Square
Oblong
Rectangular

PLUS

Blank, Pilot, Solid Head Quill, Slug Ejector Punches, and Retainers. Specials made to your specifications.

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20 pages illustrating our complete line of perforating products. Detailed dimensions and prices for each size given. Available for the asking.

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RING PUNCHES & DIES
Hard . . .
Tough . . .
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Precision-made of both Carbon Vanadium and high carbon, high chrome steels.

RING PUNCH & DIE COMPANY 110 FOOTE STREET JAMESTOWN, N. Y.

Gentlemen: Please send me a copy of your new, complete CATALOG #104 at once.

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CITY_____ ZONE_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 1431

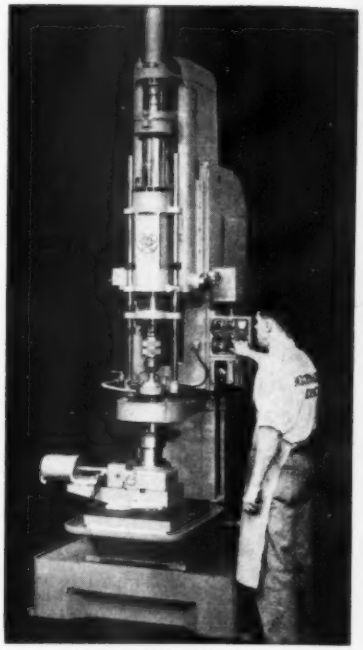
SPLINE HONING MACHINE

A broad range of honing operations is built into the design of the Hydrohoner, one adaptation being its use for spline honing. In this application hardened gears are processed so that the bearing surfaces of the splines are generated concentric with the pitch of the teeth, straight and round, and have a finish that will not pick-up and gall the shaft.

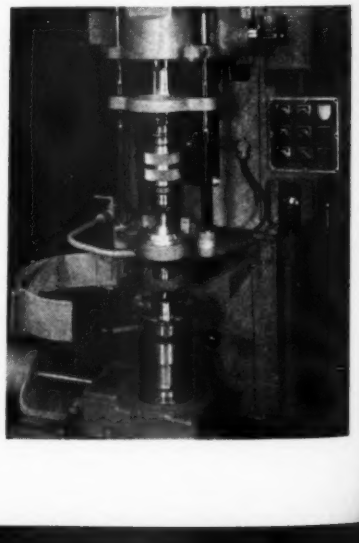
Previous to the adoption of honing it had been necessary to anneal these surfaces before the final machining operation. Result was soft bearing surfaces; character of the finish made it difficult to fit the shafts to the gears in 0.0002″ increments because the soft surface tended to pick-up and gall the shaft.

Microhoning solved this problem because surface hardness does not affect spline honing. Instead, the problem was to obtain proper tool actuation in the confined area. This is particularly significant because, unless heat-treatment is controlled very carefully, the hole may be out-of-round and tapered as much as 0.006″ when it reaches the honing operation. To remove this amount of stock and correct inaccuracies, the cutting path of the abrasive grit must be varied and all stones dressed an equal amount.

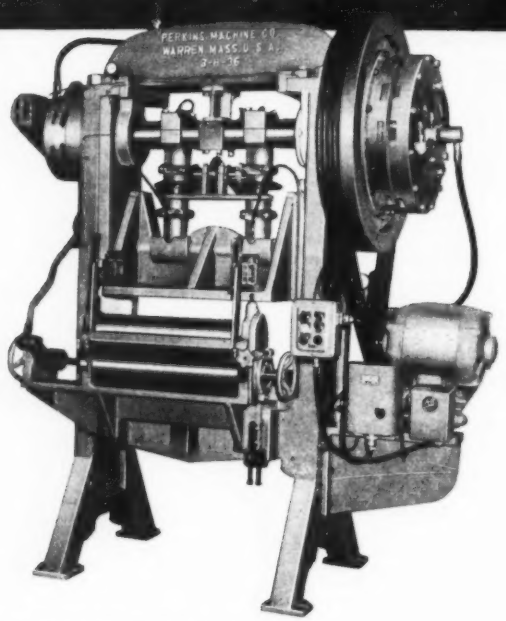
In conventional honing jobs, this is accomplished by rotating the tool as it is reciprocated through the bore. To hone splines, tools are designed with a stone for each spline—the stone about half as wide as the



Photos courtesy The Micromatic Hone Corp.



The PERKINS 3-H-36 PRESS



ARRANGED FOR
HIGH SPEED PRODUCTION!

45 Ton Capacity with Air Clutch and Air Brake. Front to back Feed Rolls. Presses of this type built in capacities from 20 to 200 Tons. Bed widths up to 72″. Can be furnished plain or geared.

PRESSES BUILT TO SPECIAL SPECIFICATIONS

Perkins Power Presses SINCE 1885

PERKINS MACHINE CO.
WARREN, MASSACHUSETTS

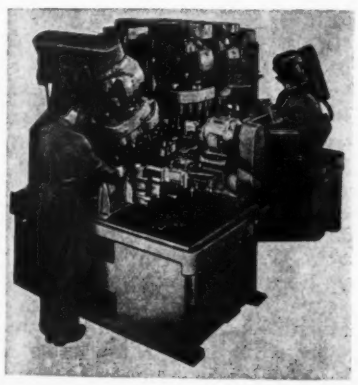
CIRCLE INFORM-A-GRAM KEY NO. 1441

spline. Rotation is replaced by an oscillating motion. The stone is swept across the spline as the tool is reciprocated. To get full surface coverage by all the stones, the part is indexed periodically during the honing cycle.

In this operation, Model 728 processes forged steel, 58 to 60 Rockwell C hardness. It removes 0.002" to 0.006" stock on diameter, holding out-of-roundness and taper to less than 0.0003" with a finish of 15 to 20 microinches. Size is held so shafts can be fitted easily with 0.0002" minimum clearance. The model has a cycle time of 35 to 40 sec/gear and turns out 350 to 450 gears in an 8-hr shift.

Transfer Machine for 450 Pcs/Hr

A single purpose drilling and tapping machine that turns out 450 carburetor bodies per hour (at 100% efficiency) has been delivered by The Hartford Special Machinery Co., Hartford 12, Conn. Designed and built for a leading automobile manufacturer, it is an eight-station, multiple spindle transfer type machine with five drill units and two tapping units.



Dual loading, the machine is equipped with an air-hydraulic transfer mechanism that advances parts from station to station. The parts ride free on rails between stations and are automatically located and clamped at each station. Locating pins engage previously machined valve holes in the carburetor bodies.

Nickel-Plate CF&I Steel Plate

The Colorado Fuel and Iron Corp. has signed an exclusive contract with the Bart Manufacturing Corp., Belleville, N. J., for nickel-plating CF&I steel plate products. Under the long-term contract, Bart will electroclad steel plate, steel mill shapes, and flanged and dished heads, according to H. C. Allington, vice president in charge of sales of the eastern division of CF&I.

The economical, easily fabricated nickel-plated products are expected to find wide applications in the oil, chemical, petro-chemical, transportation, paper, and food processing industries because of their resistance to contamination and corrosion.

The new products are the first nickel-plated steel products of this kind to become commercially available on a large scale. Purchasers of the products will be able to shape, fabricate, roll form, die form, flame cut, and shear, and weld them.

Star Performers
COAST-TO-COAST
Time SAVING!
Wheel SAVING!
Tool SAVING!
STANDARD CARBIDE TOOL GRINDERS
STANDARD builds a carbide tool grinder for every job "in the book" . . . grinders time-tested by industry for 4 decades! Ask for Literature
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Type 14 TD Wet or Dry Twin Wheel Carbide Tool Grinder 6"-10" & 14" Wheels
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One step from rough to finish grind. Conserve floor space—place grinder against the wall.
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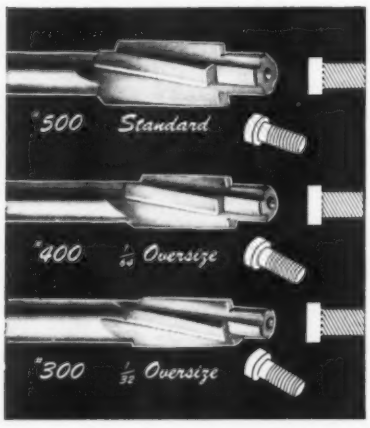
HALLMARK OF METALWORKING THROUGHOUT THE WORLD
CIRCLE INFORM-A-GRAM KEY NO. 1451

SUPERBORE
COUNTERBORES
in Standard sizes and Oversizes — above standard dimensions
- Finest High Speed Steel
- Smooth, Fast, Free-Cutting Operation
- No Clogging or Freezing of Chips
- Heat Treated



• Fore and Aft precision grinding of flutes and pilot allow chips to flow out freely. SPECIAL Pilot and Flute diameter's ground from blanks in three to four days.
• SUPERBORE counterbores in stock for immediate delivery.

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STOPPINS

• STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch NO THREADS inside STOPS for springs to catch on.

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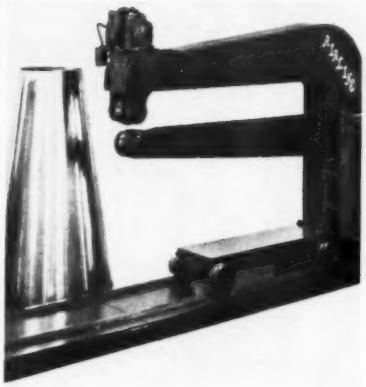
CIRCLE INFORM-A-GRAM KEY NO. 1461

Flattening Weld Area with Planishing Roll

A flat welded area is most desirable but with automatic or hand welding the crown of the weld has been accepted as the reinforcement of the weld. The drop-through on the under-side of butt welds or a depression on Mig welding without filler rod have also had to be accepted.

This condition has been tolerated or grinding operations have been resorted to and in some cases relatively crude methods have been used to flatten the weld area.



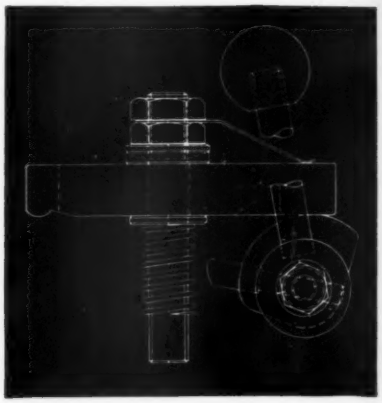
To correct this condition the automatic weld area Planishing Roll has been developed by Airline Welding and Engineering.

The adjustable low to high pressures available in the automatic weld area Planishing Roll provide these features: (1) rolls welds on stainless steel, titanium, aluminum and all other metals; (2) smooths fusion welds; (3) increases physical properties and refines the grain of weld and adjacent area; (4) controlled cold-working of weld and heat affected zone; (5) reduces grinding operations; (6) assists spinning, bulge-forming and sizing operations; (7) rolls welds on flat sheets, cylinders and cones; (8) has capacity for diameters 1¾" to 10', and lengths to 10'; (9) controlled pressure on rolls.

This machine is a fitting complement to the type of welding experienced in industry today.

Get the Lodding Jig and Fixture Parts Habit

It is a good habit to save time and money on Lodding parts. Nationally distributed—complete stocks—650 items—Coast to Coast.



Lodding self-positioning clamp assembly. One motion positions clamp and clamps work. Another releases and retracts.

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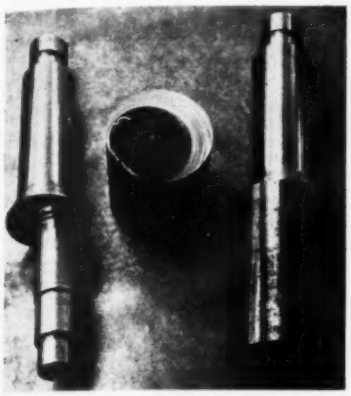
THE STANDARD LINE OF JIG AND FIXTURE COMPONENTS

CIRCLE INFORM-A-GRAM KEY NO. 1462

CARBIDE TOOLING

Tackling a high-impact cutting job, involving a special aircraft shaft of SAE 4340 steel, was no problem when Syncro Devices Inc., applied a Carboloy grade 370 carbide cutting tool on the

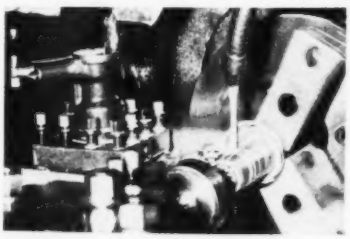


Special aircraft shaft of SAE 4340 steel machined at Syncro Devices Inc. Note completed shaft, left. Cut section, center, indicates severity of cutting job when shaft was turned off center.

work. Not only was the tool able to turn a complete shaft, but it also doubled production.

Previously, no cutting tool material had successfully handled the cutting operation to completion without several stops for tool regrinds.

As shown in the machine illustration, the operation was done on a Warner & Swasey turret lathe, and involved first making



Carboloy carbide tooling set up for turning a special aircraft shaft of SAE 4340 steel on this Warner & Swasey turret lathe at Syncro Devices Inc.

a cut to a square shoulder at the approximate center of the 2¾″ dia. by 8⅞″ long shaft; then repositioning the shaft so that it turned in the lathe 0.400″ off center for the balance of the cut.

This formed an eccentric feature for half the length requiring a severe interrupted cut of about ⅜″ depth on one side, and nothing on the other. The cut was made at 64 rpm with a 0.004″ feed. Soluble oil was coolant.

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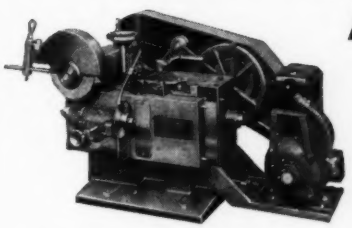

Sharpen your saws faster and better with the new Wardwell Model 35T. You make a tremendous saving both in saw sharpening costs and in purchases of new saws.

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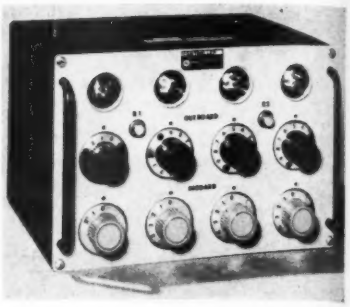
CIRCLE INFORM-A-GRAM KEY NO. 1472

CONTROLLER MECHANIZES MACHINE TOOL OPERATIONS

A new, compact, automatic digital controller for use on many types of machine tool operations has just been developed. The device can also be used to hold valves within preset limits, and may be used in general industry where automatic controls are required.

Heart of the new controller is a unit only 7" high, 10" wide and 8" deep with a count capacity of 2,500 counts. It adds and subtracts automatically at rates up to 20 decimal digits per second with an accuracy of 0.04%. The count at any instant is shown on four illuminated windows by a new type of indicator tube, known as an Inditron.

In a typical machine tool operation, this new controller was developed by American Electronic Mfg., Inc., Culver City, California, in conjunction with Sheridan-Gray, Inc. to be used



on the latter's line of Stretch Forming machines. A small transmitter establishes a digital count as the machine is operated manually from start to completion of the metal-forming operation. The American Electronic transmitter, consisting of a mechanical switch and capacitor, sends pulses to a thyratron in the controller, and the count is noted at the start and stop of the operation. Then for all succeeding operations, the skin stretcher is controlled by these two counts preset by two sets of switches on the controller.

The operator of the machine thereafter merely places a piece of aluminum in the stretcher, and at the correct count the controller starts a motor switch for the forming operation. This operation proceeds automatically until the transmitter sends the final count corresponding to the end count preset in the controller. At the conclusion of the count, the controller automatically stops the motor operating the stretcher. One man, using the new American Electronic controllers, can thus supervise the operation of several machines simultaneously and assure uniform production.

The new American Electronic controller contains two 50-position stepping switches which are so connected as to permit 50 x 50 or 2,500 counts. A third stepping switch would permit an increase to 25,000 counts. Counts come into the stepping switches from any pulsing device used as a transmitter. In the applications previously described this could be a mechanical switch, photocell transducer, or thermocouple. The counts are stored in the count register, and the number is shown on the light bank of four Inditron tubes (or five, for 25,000 counts).

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SAVE YOU MONEY!

SEGMENT DRIVING POINT IS AHEAD OF CUTTER BLADE CONTACT SO THE SEGMENT IS PULLED NOT PUSHED
WORK PRESSURE
THE GREATER THE PRESSURE THE MORE SOLIDLY THE BLADE SEGMENT HUGS THE MANDREL
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MANDREL PROVIDES DRIVING FORCE FOR BLADE SEGMENTS
BLADE SEGMENT
BLADE SEGMENT
NOTE THAT THE MANDREL DRIVES THE BLADES
LEMPCO

IT'S IN THE
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Lempco Expandable Dry Reamers have chrome plated 3-segment high-speed steel blades which are EXPANDABLE, fit standard *and* over- or undersize holes. Hand adjusted. Fewer reamers needed to cover size ranges. **SAVE!**

Lempco's exclusive 3-blade principle, consisting of two blades cutting one direction and the third blade a reverse cut, produces a *burnishing* operation, assuring fine finishes in MICRO INCHES. Re-sharpen or replace *blades*, not entire reamer. **SAVE!**

BY THE MAKERS OF FAMOUS LEMPCO BALL BEARING DIE SETS

LEMPCO
PRODUCTS INC.
INDUSTRIAL DIVISION • BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1481

One set of switch controls on the front panel of the controller sets up any four-digit number, positive or negative, up to 2,500 and is preset by the operator to control the level of one input to the controller; or the level for starting or stopping an operation, making a machine go forward or reverse, etc. When the count stored in the count register, the stepping switches, reaches this preset number from the first input, a signal goes to the grid of a driver tube which operates a relay and provides an output control signal from the controller. A second similar circuit, completely independent, operates with the second set of preset control switches on the front panel and operates a second relay through a driver when there is coincidence between the input count and the preset number. Thus the controller provides two inputs and two outputs.

—•—

Atomic Exposition and Congress is Fast Taking Shape

Hundreds of companies have already indicated their interest to exhibit in the first major Atomic Exposition. The Exposition will be held in Cleveland's Public Auditorium late this year under sponsorship of the American Institute of Chemical Engineers.

This event is being planned in conjunction with a Nuclear Congress co-sponsored by 16 management, engineering, and scientific societies. Each of the societies is expected to select and furnish speakers for the technical program. More than 200 technical papers are anticipated.

Advance interest indicates that exhibits will fall into three major classes:

1. Suppliers of materials, parts, equipment and services to the atomic power and allied fields.
2. Companies directly identified with the nuclear power field.
3. Companies in the non-power atomic fields such as the manufacturers of equipment and materials for the application of radioactive isotopes.

"The Exposition is actually being tailored to the interests of six basic audiences, each with an intense interest in peacetime uses of atomic development," according to Athel F. Denham, Exposition Director.

The six audiences are:

1. Users and potential users of materials, equipment services, etc., based on nuclear developments.
2. Companies outside the nuclear industry seeking developments that can be applied to their fields.
3. Management, engineering and scientific personnel in the nuclear power and allied fields.
4. Producers of components, materials, equipment and services for use in the nuclear industry.
5. Representatives of government and education.
6. The general public (to be admitted only during non-business hours).

Further information may be obtained from the Atomic Exposition, 931 Book Bldg., Detroit 26.

broaching equipment FOR EVERY REQUIREMENT

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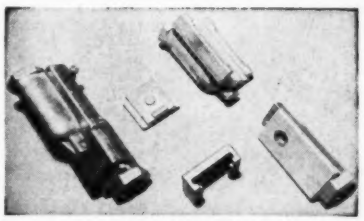
Note this SV-6-42 Vertical Single Slide Machine that broached the Hydraulic Coupling Assembly Parts shown below. T-Slot Grooves and T-Shaped Sections were entirely finished by broaching. 2 Parts broached simultaneously at a rate of 300 per hour. Close tolerances maintained.



Our complete line of Broaching Machines and, facilities for making all types of broaching tools, work holding fixtures, broach holders and pull and push heads offers equipment to meet any individual need.

LET US SUBMIT RECOMMENDATIONS. WRITE TODAY, NO OBLIGATION OF COURSE.

ACME BROACH CORP.
MILAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1491

TAP STANDARDS ARE STUDIED BY SCREW MACHINE GROUP

Ever since the development of modern automatic screw machines, and other machines for the tapping of holes, there has been a missing link in the engineering standards for taps. The standard dimensions of hand taps have made no provision for their easy adaptation to automatic screw machine use.

On the average, standard hand taps are too long to fit in the available space between the spindle nose and the tool holder position of automatic screw machines. This has required the purchase of special taps, or the alteration of standard hand taps by cutting off excess length on the shank and, at times, the excess threaded portion of the tap.

Special taps are costly to manufacture and, therefore, higher priced. Altering standard hand taps in the average shop requires extra time and, when the threaded portion of the tap must be shortened, taps must be rechamfered for cutting accuracy. As all taps have a slight back taper in the threaded portion, an undersize condition may result from cutting off the front end of hand taps to fit the machines.

Years ago, the National Screw Machine Products Association had a similar problem with standard drill lengths being too long to fit standard screw machines. A set of standards was devised and, with the cooperation of the drill companies, became a regular item of production by the drill manufacturers.

A committee appointed by NSMPA in 1953 has now arrived at a set of standards believed satisfactory to all 280 member companies of the NSMPA. These standards were made possible by the close cooperation of the Besly-Welles Corporation.

The new standards primarily decrease the over-all length of the tap, furnishing both a shorter shank and a shorter threaded portion. The shank will be made to the nominal OD of the tap. This will increase the strength of the tap in the larger diameters, as present hand taps use a turned-down shank.

The shank diameters will be ground concentric with the threaded portion to insure accurate alignment. The shank diameters will be held to a + 0.000" –0.001" below nominal dimension of the tap. This will allow for easy entry into standard bushings made for holding stub taps. This standardization of shank diameters will eliminate special size bushings and bring us closer to a more unified standardization on dimensions.

The squares on the tap will be eliminated excepting two small flats on the ends of the shank for use as driving surfaces in the manufacture of the taps. The elimination of the long squared portion of the taps will provide greater bearing surface in the bushings, improving alignment between tap and work and guarantee better holding power.

The new NSMPA stub tap standards will supplement existing standards with an additional line of taps suitable for direct application to automatic screw machine production.

FLYING REN-ITE

FOR LOW COST AIRCRAFT
PRECISION TOOLING
REN-ITE PLASTIC IS THE ANSWER

Ren-ite—the dimensionally stable tooling plastic—is flying high in the esteem of aircraft engineers . . . "Faster", "Easier", "Tooling time cut up to 70%" are some of the claims made for Ren-ite by the Aircraft Industry.

Some Ren-ite aircraft applications—master models, dies, drill fixtures, stretch press forms, routing fixtures, skin panel checking blocks, checking fixtures, inspection gauges, assembly fixtures and many others and Ren-ite research is developing many more.

Ren-ite is thermosetting epoxy resin for use as a laminating plastic without application of heat or pressure for general tooling applications . . . unaffected by moisture or temperature change, resistant to acid, alkali, grease or common organic solvent action.

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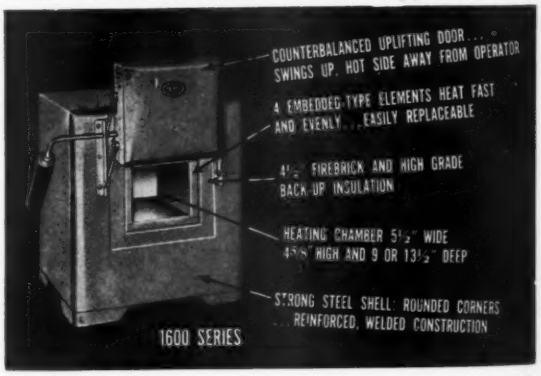
solve heat-treat problems
with versatile Temco bench-type furnace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4 EMBEDDED-TYPE ELEMENTS HEAT FAST AND EVENLY . . . EASILY REPLACEABLE
FIREBRICK AND HIGH GRADE BACK-UP INSULATION
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STRONG STEEL SHELL: ROUNDED CORNERS REINFORCED, WELDED CONSTRUCTION
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THERMO ELECTRIC MFG. CO., 474 HUFF ST., DUBUQUE, IOWA

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MEEHANITE® MOLDS

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Automobile Intrument Panel of Fiberglass. Shown by courtesy of Molded Fiberglass Body Co., Ashtabula, Ohio.

FIBERGLASS AUTOMOTIVE AND APPLIANCE PARTS

● Meehanite tops the list of cast mold materials for Fiberglass parts, because of its unique combination of physical properties.

It can be cast in intricate shapes with minimum finish.

The metal is clean and dense—there are no porous areas. It will take a high finish.

Trim edges can be flame hardened to outlast hardened tool steel inserts and you save the price of the inserts.

The castings are pressure-tight—no leakers.

The price of Meehanite castings is reasonable and deliveries are prompt. Not only that—but you can get castings in any size up to 20 tons in weight.

If you are interested in fiberglass or plastic molds or any other high strength iron application, let us discuss them in detail in a personal interview.

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HEAVY JOBBING MACHINE SHOP—METALIZING

MEEHANITE IS STEEL CAST IRON BRIDGES THE GAP

CIRCLE INFORM-A-GRAM KEY NO. 1503

New Bliss Press Forms Heat-Treated Aluminum Alloy

Wing stiffeners, inner skins and similar components for Boeing's B-52 Strato-fortress are now being produced on this 7000-ton Bliss Hydro-Dynamic press, recently installed at Boeing's Wichita plant.

The press, essentially a single-action press of open-rod "moving-down" construction, is as big as a two-story house and weighs about a million pounds. Despite this mass, the slide can be advanced and returned at a rate of 300 in/min. and can be "inched."

According to Boeing engineers, the tremendous pressures they obtain with this Bliss Hydro-Dynamic make it possible to heat treat aluminum "super alloy" parts prior to forming them in the press. Parts produced this way are more suitable because they have the higher mechanical properties needed to withstand the stress of near-sonic speeds.

From a cost standpoint, the use of the rubber pad technique Boeing uses with the press is desirable, particularly in short run production, since it just about halves the cost of tooling long-length parts. The size of the rubber pad (4′ by 10′) makes it possible to load the die slide with a variety of work. The two die slides, both power-operated, are located on opposite ends of the press. While one slide is in the press, a separate crew loads the other slide, thereby utilizing press time to the fullest.

Although during World War II, E. W. Bliss Company designed and built multi-slide rubber pad presses for practically all aircraft manufacturers, this 7000-ton behemoth at Boeing is the largest to date, and is one of the largest in use in the country.

Aircraft Parts Forged with Cast Beryllium Dies

Cast beryllium copper dies may soon be used for forging of large steel, aluminum and magnesium aircraft parts, according to a Beryllium Corporation report.

Beryllium has produced to date most of the beryllium copper dies tested in the experimental forging die program now being conducted by North American Aviation, Inc. Wyman-Gordon Co. has revealed that recent advances in design and foundry techniques now permit casting of beryllium copper dies in larger sizes and with longer life than previously thought possible.

Success in forging aircraft parts with cast beryllium copper dies has been announced by North American. Casting of the forging dies of beryllium copper — instead of machining the die cavity out of a steel block — reportedly cut aircraft delivery time and slashed die costs by as much as 75%.

The ultimate goal — the application of this low cost forging technique to larger aircraft parts and structural sections — is now in sight, because of the following design and metallurgical advancements:

1. Development of improved techniques to obtain properties needed to insure long die life.

2. Improved die surface finish that will further minimize the final machining that is now necessary.

3. Improvement of frictional properties of the casting alloy to the point where galling and the need for lubricant are virtually eliminated.

4. Application of a special beryllium alloy as a die material for forging titanium, which must be run at higher temperatures than the standard aircraft alloys.

In addition to drastically reduced die costs and forging lead time, the use of cast forging dies permits still other economies. At the completion of a production run the cast die metal can be melted down for subsequent reuse. And instead of a heavy steel die, all the press shop has to store is the die pattern which then can be used later to produce rapidly another set of dies when needed.

Beryllium has successfully applied its casting alloy to the production of low cost, long life sheet metal forming dies and patterns for the shell molding process.

The high strength and hardness of the alloy in combination with its remarkable ability to reproduce detail, has made beryllium copper ideal for these applications.

New Multi-Purpose Steel-Cutting Carbide Announced

A new multi-purpose sintered carbide steel-cutting material, designed for increased productivity on both high and low-speed machines through wide ranges of application, has been announced by Kennametal Inc., Latrobe, Pa.

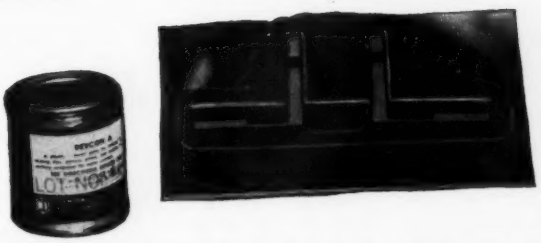
Outstanding characteristics of the new material—grade K21—are high edge-strength, combined with superior wear qualities, and excellent resistance to cratering. It is particularly effective on plunge and interrupted cutting of castings having sand inclusions and hard spots.

Announcing the new grade, Kennametal officials said, "K21 was created for a wide range of application. It has a Rockwell A hardness of 91.5 plus high transverse rupture strength. It was specifically designed for general cutting, heavy roughing and finishing of steel products with a range broad enough to get the most out of today's high-speed machines, as well as step up productivity on older, slower machines.

. . . Continued on page 150.4

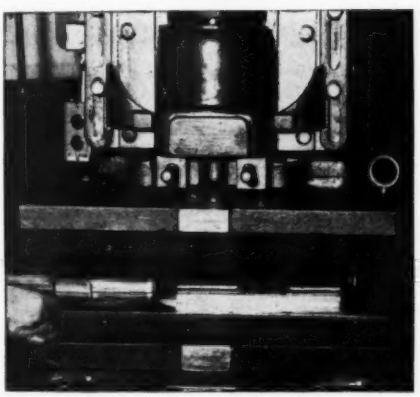
DEVCON
the PLASTIC STEEL

for making durable and permanent drill fixtures and jigs, forming and drawing dies, holding devices, models and many other types of industrial equipment — at a great saving of time and money.



Holding device made from DEVCON "A" which can be mounted on a steel plate and then used on magnetic tables for machining the top surface of the part.

A two-jaw lathe fixture made of DEVCON for holding irregularly-shaped pieces during turning is mounted on a steel plate which, in turn, is mounted on the face plate of a turret lathe.



A male forming die made of DEVCON "B" mounted on a 40-ton press. A run of approximately 5,000 pieces of 22-gauge brass was made from this DEVCON die.

EASY TO HANDLE. Requires no special training.

NON-SHRINKING, NON-EXPANDING. No variation or distortion.

WILL NOT SAG OR RUN. Can be applied to a vertical surface.

REQUIRES NO HEAT OR PRESSURE. No special equipment.

LIGHT WEIGHT. Weighs one-third the weight of steel.

CORROSION AND ACID RESISTANT. Resists most solvents, acids, oils, etc.

LONG STORAGE LIFE. Minimum of 12 months under normal conditions.

DEVCON is a combination of approximately 80% steel and 20% of a special plastic. It is as easy to handle as putty. After the desired shape is formed **DEVCON** becomes an extremely strong, tough and rigid metallic piece in approximately two hours hardening time.

DEVCON "A" is a non-sagging putty. **DEVCON "B"** is a semi-viscous liquid.

PHYSICAL PROPERTIES:
Tensile strength, 10,000 p.s.i.; Compressive strength, 15,000 p.s.i.; Flexural strength, 13,000 p.s.i.; Impact strength, foot pounds per inch of notch, Izod 0.7-0.8; Rockwell Hardness, F Scale, 75; Solids, 100%.

SAVE $ $ $ $ on JIGS-MOLDS-MODELS-FIXTURES-FORMING DIES REBUILDING MACHINERY - SALVAGING METAL PARTS.

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Gentlemen: Please send me the following:

- ☐ Trial Kit (4-lb. Cans) $11.40
- ☐ 1 lb. DEVCON (½ pt. Can) 3.00
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Quantity order discounts on application.

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Open account shipments on purchase orders of rated companies. Otherwise, check must accompany order. No C.O.D.'s, please. *Ohio customers add 3% sales tax.

CIRCLE INFORM-A-GRAM KEY NO. 1504

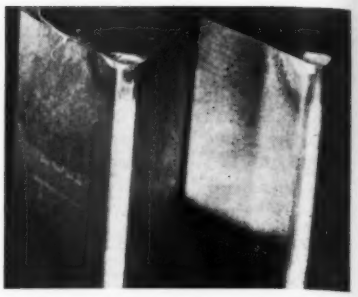
. . . Multi-Purpose from Page 150.2

"Reports of remarkable performance are coming in daily."

At Greensboro, N. C., the new carbide was used in the form of a TB16 insert while machining an SAE 1080 steel casting that had proved troublesome with other grade tools. The part required turning 6" and 8" diameters, which were 2" and 2½" long, respectively. The eccentric 8" dia. was completed with only half the external surface machined. The ⅜" depth of cut was taken at 236 sfpm and 0.0167 ipr. The 6" dia., roughed at the same speed and feed, provided a full cut around the circumference. Finish cuts were 1/16" deep and made at the same feed but 324 sfpm. A good flow of a synthetic soluble coolant was applied on both cuts.

Using a TAR-86A holder with a heavily-honed insert edge, the first corner ran 6 pcs before indexing and the second turned 4 before the lot of castings was completed. And, it was still in condition for additional usage. This compared well with the 1 piece per index obtained with a competing grade.

In still another example, at St. Louis, the finish turn on silicon-steel stator cores was accomplished at 702 sfpm, 0.010" feed, and 0.005" depth of cut. K21 averaged 60 pcs/index and the competitive grade only 45 pcs/index. This, although K21 is not specifically intended for light usage.



The new carbide grade—K21 (left)—is expected to become even more popular than the K2S (right). Each of these inserts produced 134 pcs under identical conditions. The K21 insert shows less edge wear and no chipping.

A Buffalo machine and tool company experienced no chipping and less edge-wear with carbide grade K21. In this application, K21 is cutting an eccentric shaft, 1" off center, with a 7/16" cut per side, and feed of 0.015". The first cut was taken at 310 sfpm and the second at 360 sfpm.

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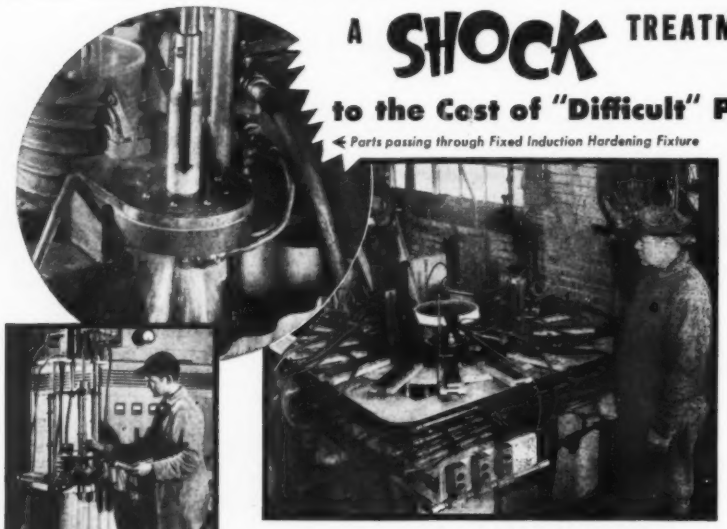
A SHOCK TREATMENT to the Cost of "Difficult" Parts



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MOVIES WORTH VIEWING . . .

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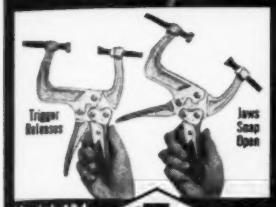

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TRIGGER-RELEASE—Finger pressure on Trigger instantly throws jaws wide open, ready for next clamping action.

GREATER CLAMPING PRESSURES—Up to 1200 pounds may be exerted. Normal operating pressures of 300 to 500 pounds are easily attained.

RUGGED CONSTRUCTION—60% heavier heat-treated forged components. Hardened bushings locked with spun rivet.

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Model 482

Model 486

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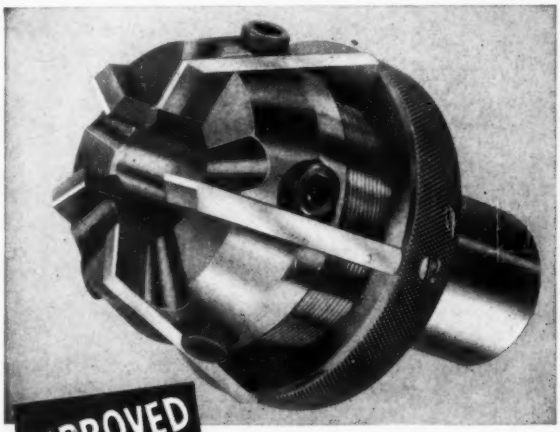
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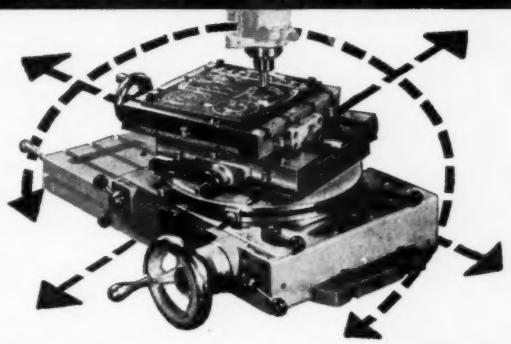
ADVANCE
CROSS-SLIDE ROTARY TABLE



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Make multiple radii and angle milling cuts accurately with only ONE set up! On your standard vertical mill, equipped with ADVANCE Cross-Slide Rotary Table, you can make all such cuts without re-clamping work. Size of radius you can cut is limited only by milling machine table movement. Ideal for molds, dies, patterns, etc.

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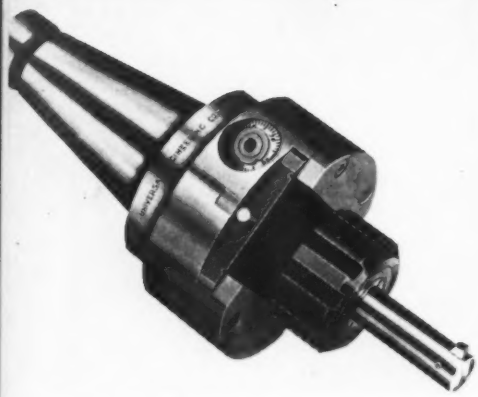
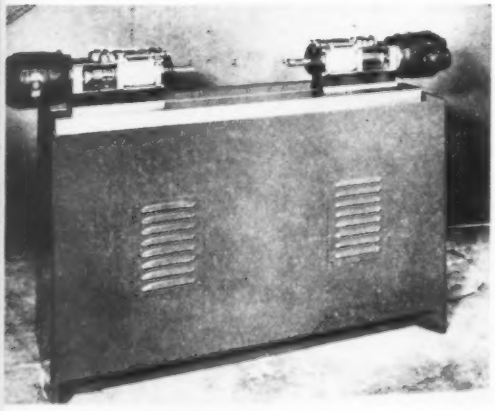
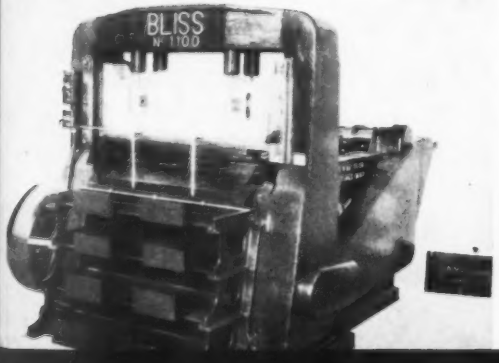


BORING CHUCKS . . .
The Universal "OZZ" boring chuck fills the need for a tool that is heavy and rigid enough for all types of rough boring without chatter. Model "OY" (not shown) is a smaller tool for both rough and finish boring. Both are hardened and ground and feature enclosed mechanisms. Universal Engineering Sales Co., Frankenmuth, Mich., or — **Circle No. A1.**

SUPER FINISHER . . .
On this super finishing machine for carbide tools, a highly finished lapped cutting edge can be obtained in a few seconds with a diamond hone instead of the normal 6″ diamond wheel, at negligible coats. Lapping motion is with a reciprocating movement in four directions in a vertical plane. Wickman Mfg. Co., 10325 Capital Ave., Detroit 37, Mich. **No. A2.**

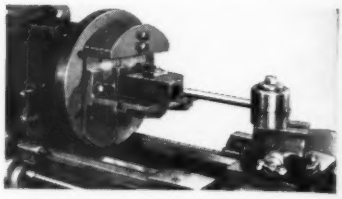


MACHINE BASE . . .
The new M23C-1 double end machine base, shown with two Holomatic drill units mounted, was designed to simplify the building of automation-type special machines for drilling and/or tapping opposed holes. A 1″ keyway is provided the full length of the top. Hause Engineering Co., 809 S. Pleasant St., Montpelier, Ohio. **Inform-A-Gram No. A3.**



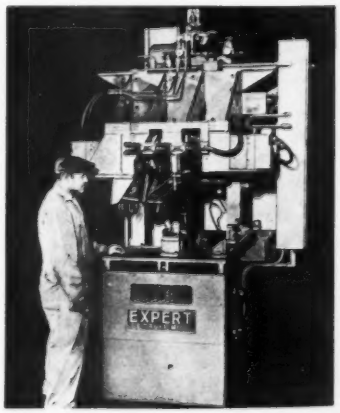
SCROLL SHEAR . . .
This shear for high speed blanking of scroll strips has a wider bed for handling larger sheets (to 36″ sq.) to allow more strips per sheet. Double and triple dies can be used on it. Model No. 1100, E. W. Bliss Co., Canton, Ohio. **Circle No. A4.**

LATHE FIXTURE . . .
This Universal precision lathe fixture provides a ready means of locating and holding non-round work and odd shapes for machining on engine lathes, turret lathes, grinders and borematics. Here it is holding a gear



case casting for a production boring operation on an engine lathe. The fixture is equipped with a precision "centerline" locating pin from which very accurate vertical locations can be made. Adjustable counterweights insure proper balance in operation for tool room, production, and maintenance applications. Get details from Universal Vise & Tool Co., Parma, Mich., or — **Circle Inform-A-Gram No. A5.**

WELDING PRESS . . .
A new line of compact low-tonnage inverted mechanical presses designed for a wide variety of spot and projection resistance welding operations is now available from Expert Welding Machine Div'n, 17144 Mt. Elliott Ave., Detroit 12. Both upper and lower platens have accurately spaced tapped holes which permit quick changeover from one electrode and fixture or die arrangement to another. **Circle Inform-A-Gram No. A6.**



ON PARADE

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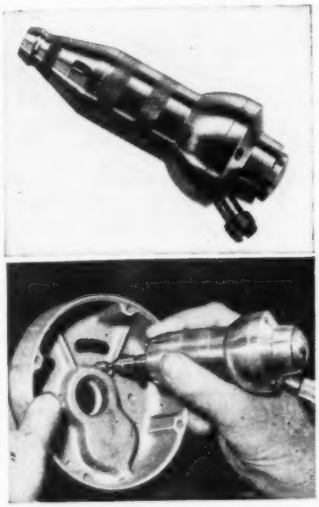
AIR GRINDER . . .

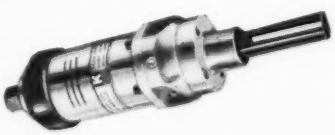
Introduction of a turbine-type air grinder called the haskAIR Grinder marks R. G. Haskins' expansion into the pneumatic tool field. The new grinder weighs 18 oz and develops 1/5 hp at 75,-



000 rpm. Special features include permanently sealed bearings which eliminate the need for lubrication in air lines or the grinder itself; removable nose piece for extra-deep grinding; lightweight, hand-fitting aluminum housing that enables pencil-like control for precise grinding. Gyro-action of the turbine holds the tool steady. Get details from R. G. Haskins Co., 2651 W. Harrison St., Chicago 12, Ill., or —
Circle Inform-A-Gram No. A7.

VANE-TYPE MOTOR . . .

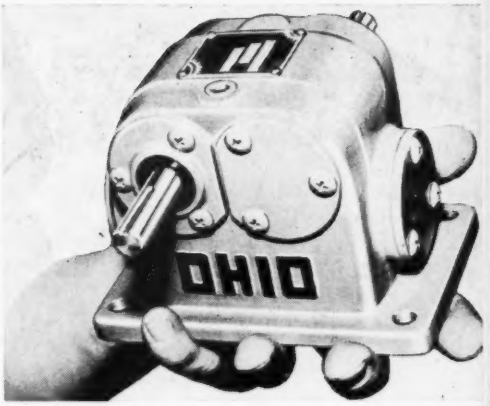
The new vane-type air motor features compact construction and high power output. Available in eight styles, the 71J-40 series develops 1 hp, is designed for continuous duty, and is non-sparking for safe use in hazard-



ous locations. Ask for Catalog Section 71 from Keller Tool Div'n of Gardner-Denver, Grand Haven, Mich., for complete information, or —
Circle Inform-A-Gram No. A8.

SPEED REDUCER . . .

Ohio Gear's small, redesigned, horizontal DOX double reduction speed reducer with zinc alloy housing is available in ratios of 4:1 to 1600:1, with torque capacities of 25 in-lbs to 150 in-lbs, utilizing 1/6 hp. It is especially adaptable to conveyors, pump drives, industrial and home workshop equipment, etc. Ohio Gear Co., 1333 E. 179 St., Cleveland 10, or
Inform-A-Gram No. A9.



END MOUNT . . .

An end mount for standard Hydro-Line hydraulic cylinders, for machine tool builders, that complies with J.I.C. standards has been introduced by Hydro-Line Mfg. Co., 5769 Pike Rd., Rockford, Ill. It was designed especially for use on machine tools with long sliding beds and is easily removed with a minimum of downtime for maintenance.
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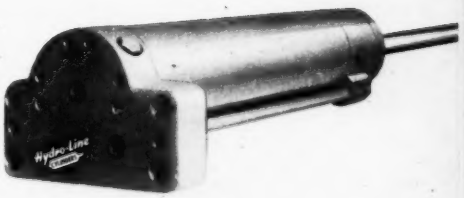
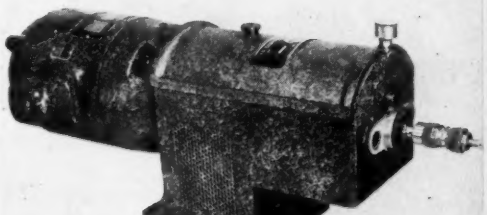


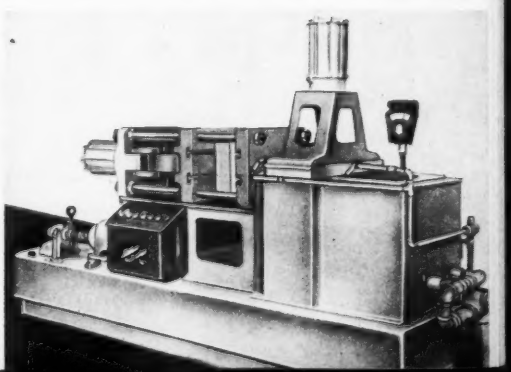
LEAD TAPPER . . .

The Ettco-Emrick A.T.U. No. 3 lead screw tapping unit was specifically designed for fast, precision single and multiple spindle tapping and threading. It uses a principle of instantaneous-acting forward and reverse electromagnetic clutches. Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y., or —
Inform-A-Gram No. A11.



DIE CASTER . . .

This low cost, high speed die casting machine will handle shot capacities up to 2½ lbs. Other features include 80-ton locking pressure and automatic electric cycling at high speed. American Die Casting Machinery Co., 1516 W. Thomas St., Chicago 22, or — **Circle No. A12.**



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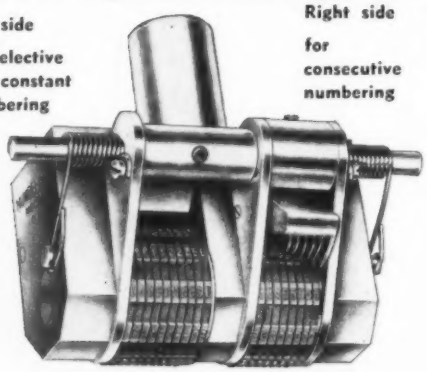

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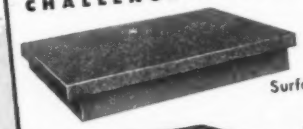

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Rated Class A. Surface accuracy guaranteed. 24 sizes.

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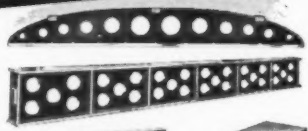

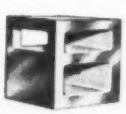

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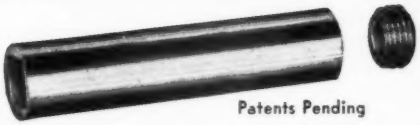
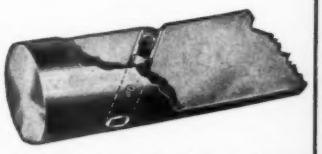
How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH RD., DETROIT 19, MICH.

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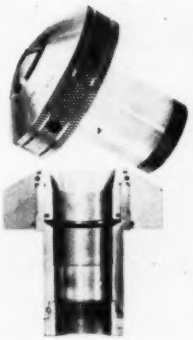
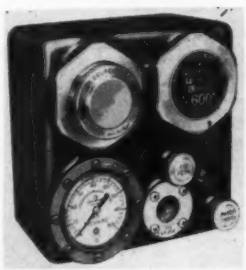
The Fully-Jeweled and completely shockproof movements of all "Em-Re" dial indicators will give accurate, repeated readings on any application. For those who service their own indicators, all but six parts are interchangeable between all models. Petz-Emery Inc., Pleasant Valley, N. Y.
Inform-A-Gram No. A13.



The "Chukollet", an improved ball bearing actuated collet chuck, is supplied with an adjustable internal stop and can accurately hold short pieces, thin-walled cylindrical parts, and soft-threaded parts without damage. It can also be used to hold round, square, and hexagonal workpieces for milling, slotting, drilling, tapping, counterboring, and grinding. Hancock Mfg. Co., Inc., Santa Clara, Calif.
Inform-A-Gram No. A14.



Keep Air Operated Equipment Working at full capacity by regulating the pressure and filtering and lubricating the air with one of the new Logan R-F-L Units (Model 600). Uniform working pressure is maintained by leveling out surges and sudden drops in the air supply. Logansport Machine Co., Inc., Logansport, Ind.
Inform-A-Gram No. A15.

This New Rotary Hopper, designed to provide accurate, high-speed parts delivery to machine tools, operates by means of a fully enclosed, continuous-duty motor and has a slip clutch for overloads. It is fully adjustable and can be supplied with as many as four separate feeding tracks. Feedmatic, Inc., 22515 Telegraph Rd., Detroit 19, or —
Inform-A-Gram No. A16.

A Barrel Handling Truck requiring no tipping or pick-up space when handling barrels touching each other is announced by Valley Craft Products, Inc., 760 Jefferson Ave., Lake City, Minn. Valley Barrel Cart Model 600 is equipped with an automatic spring actuated bar that allows a hook to slip over the barrel edge as the truck is moved against the barrel without the operator touching either the hook or barrel.
Inform-A-Gram No. A17.

Would *you* use a ruler for *precision* measurements?

Pretty silly question. But it's one way of pointing out the solid advantages of JO-LINE Torque Tools over ordinary torque equipment...about like a micrometer as compared with an ordinary ruler. The JO-LINE Torque Wrench gives you:

★ **TORQUE LIMITATION** Here—responsibility for exact torque control rests squarely with the wrench itself—not with various operators.

★ **ACCURATE CALIBRATION** Each JO-LINE Torque Wrench is calibrated to less than 1% error, and is *certified to* within 3% accuracy in writing.

★ **JUST SET YOUR TORQUE** ... cuts out automatically ... no lights, dials, or gauges to read. Lightweight and well-balanced, the JO-LINE is as easy to use as a socket wrench.

★ **CENTER OF TORQUE** Use one hand, two hands, or even a long extension handle...the JO-LINE always provides the same unvarying tension.

★ **RUGGED CONSTRUCTION** JO-LINE Torque Wrenches have been tested through 50,000 cycles. This built-in durability is supplemented by sealing the torque-sensing mechanism so that dirt or liquids cannot affect precision parts.

- *for torque requirements from 10 inch-ounces to 2000 foot-pounds*
- *designed to meet specifications MIL-H-4034A (USAF)*

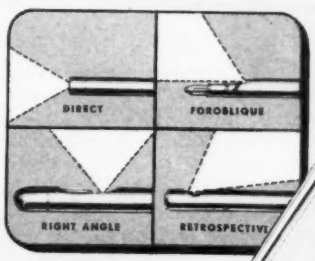
Write today for your FREE JOMI Catalog with valuable Torque Table Data.

JO LINE TOOLS, INC. 8442 Otis Street, South Gate 1, California

CIRCLE INFORM-A-GRAM KEY NO. 1551

A.C.M.I. BORESCOPES

for close-up visual inspection of internal surfaces and hidden parts



A.C.M.I. Borescopes are available in 4 angles of vision (as above)—in diameters of .120" to 4.00"—in lengths of 4" to 720". Special models for special problems.

A.C.M.I. Borescopes permit close-up visual examination of interior areas and surfaces not otherwise visible. They save time and money, and prevent costly dismantling. • Each Borescope is a compact, self-illuminated industrial telescope of highest quality, employing a precision optical system, that produces a flat visual field. Lens systems are fully corrected for color, spherical aberrations, and coma, with all lens surfaces coated to increase light transmission

Write for free informational folder, or tell us your problem.

American Cystoscope Makers, Inc.
1241 LAFAYETTE AVENUE NEW YORK 59, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1552

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Metal Plan Files
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Mayline plan files, intermember into firm, solid, safe filing units. They have hinged dust covers and a very fair price. See your local dealer, or write for folder S-20.

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PLAN FILE WITH HINGED DUST COVER

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635 NO. COMMERCE ST.
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MAYLINE

CIRCLE INFORM-A-GRAM KEY NO. 1561

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The Most significant advance in a quarter Century of HEIGHT GAGE DESIGN

EASY READING 2-1/2" LONG VERNIER
RAPID QUICK ADJUSTMENT
TOP VIEW
TRIANGULAR SCALE BEAM for Superior Strength and Rigidity, preventing sway and vibration.
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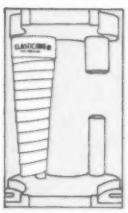
CIRCLE INFORM-A-GRAM KEY NO. 1562

Leading Auto Makers Save $1,250,000* On Dies Equipped With

ELASTICONE GUIDE PIN COVERS

**Actual savings reported during one year on materials, maintenance and manpower!*



Leading auto makers, like many other major industries, have reduced the costs of die operations by equipping dies with Elasticones. Elasticones close the gaps between pins and bushings, protecting pins against nicks and scratches, reducing die breakage, increasing press time!

Elasticones reduce the need for spare dies, make automatic press work possible. Write today for complete technical data and literature. Elasticones are available in stock and custom sizes.

CENTRAL

6603 MARSDEN STREET
PHILADELPHIA 35, PA.

CENTRAL SAFETY EQUIPMENT COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1563

MAXWELL
AUTOMATIC RECESSING TOOLS
REDUCE INTERNAL FORMING COSTS

These fully automatic, quickly adjustable tools save time, and cut costs on precision grooving, undercutting, inaccessible spot facing, chamfering, back facing and necking!

Maxwell Type JF Automatic Recessing Tools operate on the principle of an eccentric cutter holder actuated on its own axis. This is accomplished by the unique Maxwell Helical Gear and Diagonal Toothed Rack Mechanism.

They are used with jig or fixture on automatic or manual feed machines. Long-life circular form cutters, or tool bit holders with tool bits may be used. Location and diameter of recess are individually controlled by stop collars, adjustable to within ±0.001-inch. Five sizes available to pilot into 1" to 2¼" bushings. Furnished with shank to suit.

392R-MC

WRITE TODAY FOR BULLETIN NO. JF

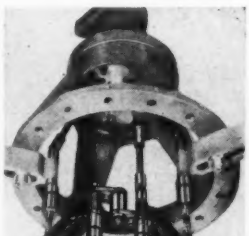
THE MAXWELL COMPANY
250 BROADWAY • BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1564

"Oil Mate," a leakproof, pocket-size lubricator that dispenses a drop or a dab of oil at a time, has been introduced by Gray's Ltd., 215 W. Seventh St., Los Angeles 14, Calif. Fingertip pressure on the plunger dispenses any viscosity oil exactly where it is needed.
Inform-A-Gram No. A18.

This New Rubber Hardness Gage has a second hand that moves with the dial hand and remains at maximum reading until reset. The gage can be read after removal from the specimen being measured. It measures rubber hardness instantly, gives creep reading, and is accurate to ½ Durometer point. Get full details from the manufacturer, W. F. Orth, 800 S. Ada St., Chicago 7, or —
Inform-A-Gram No. A19.

This Light Weight Impact Wrench of ⅜" bolt capacity is made of magnesium cast parts, reinforced with helical steel thread inserts and steel hood for ruggedness. Its direct-drive air motor gives 1,800 impacts per min. with "Turn-Over" impact parts for lower maintenance. The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio.
Inform-A-Gram No. A20.



This "Twin-Spindle" Attachment for the Commander Multi-Drill permits driving two collet type spindles from any one of the Multi-Drill spindles, enabling the user to drill up to double the normal number of holes at one time. Spindle centers can be set as close as ⅞". Commander Mfg. Co., 4225 W. Kinzie Ave., Chicago, will send complete information.
Inform-A-Gram No. A21.

This "Controlled-Air-Power" Device for direct-spindle tapping without the use of tapping heads or clutches has been introduced by The Bellows Co., Akron, Ohio. Featured are the rapid air-powered approach to the work and smooth hydraulic feed through the work at any preset rate desired. The units may be mounted at any angle in any plane. **Circle Inform-A-Gram No. A22.**

Tough grinding jobs? Check Vulcanaire high speed precision grinding heads!

Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Vertical adaptor for Surface Grinders. Grinding small slots

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

Horizontal application. Grinding a shoulder Punch.

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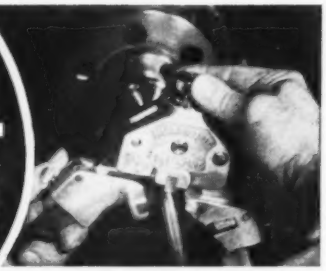
Engineering, Processing, Designing and Building... Special Tools... Dies ... Special Machines ... Vulcamatic Transfer Machines ... Automation ... including the Vulcan Hydraulics that Form, Pierce, Assemble and size. ... Vulcanaire Jig Grinders ... Motorized Rotary Tables ... Plastic Tooling.

VULCAN TOOL CO.
10 PRITZ STREET • DAYTON, OHIO
CIRCLE INFORM-A-GRAM KEY NO. 1571

Hone parts to .0001" tolerance on any lathe or drill press

with inexpensive **Odee-HONE**



The Odee-Hone quickly produces an accurately honed finish on any type of external cylindrical part. It removes a few tenths or several "thousandths" stock to bring parts to size in less time than is required to set up for grinding.

Corrects all out-of-roundness, waviness and chatter.

Hones parts from ½" to 2½" in diameter, any length, any material.

Requires no aligning, fixturing or wheel dressing.

No springs, no hinges to break or wear out.

Weighs only 2½ pounds.

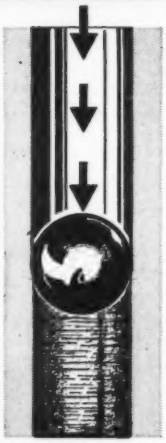
Can soon pay for itself in time saving. Write for detail sheet AR-116 and price.

MICROMATIC HONE CORPORATION
8100 SCHOOLCRAFT • DETROIT 38, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1581

BALLIZING

For NEW Speed and Economy in Hole Sizing and Finishing



BALLIZING is a precision high-production process for sizing and finishing die-cast, drawn, and machined holes — simply by pressing a ball through the unfinished hole. With alloy steel and tungsten carbide balls available in practical quantities and in any size required, this process is used with holes of all diameters.

MAJOR ADVANTAGES:

FAST; takes only seconds. ACCURATE. FINE FINISH — burnished smooth. ECONOMICAL. Uses unskilled labor. No tool sharpening. No close adjustments. No special equipment.

FREE BALLIZING BULLETIN gives details; shows typical applications. May we send you a copy?

INDUSTRIAL TECTONICS, Inc. ANN ARBOR 7, MICH.

ITI **PRECISION BALLS**
All Materials — All Sizes
In Large or Small Quantities

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Drill Hardened Steels without Annealing –

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It—
With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1368 East 222nd St. • Cleveland 17, Ohio

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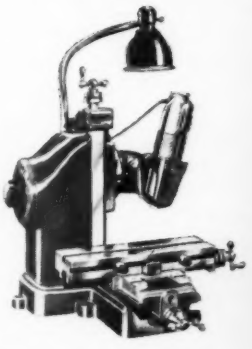
BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS
Write for information

CIRCLE INFORM-A-GRAM KEY NO. 1582

Precise HIGH R.P.M. MILLING MACHINE

UP TO 45,000 R.P.M. AND ½ H.P. FOR LOW COST SMALL PARTS MILLING

The first . . . the ONLY Universal Milling Machine with the speeds and sensitivity needed for precision small parts milling with tungsten carbide and other midget mills. Parts for watches, radio, TV, automobiles, aircraft—virtually any small part made of steel, brass, aluminum or plastics can be milled in production in less time to tolerances as close as .0001". PRECISE Heavy Duty Power Quills ride on four micro-precision bearings with sealed-in lubricant. Built-in Control provides speed settings between 15,000 and 45,000 R.P.M. Complete line of accessories and cutting tools is available for unlimited versatility.



CONDENSED SPECIFICATIONS
Table Working Surface, 4" x 12"
Table Travel, 5"
Transverse Travel, 3"
Rise and Fall of Spindle, 3½"

Call Your Industrial Distributor or Write for Catalog.

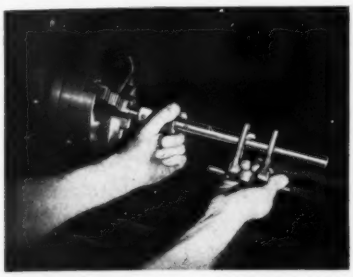
PRECISE PRODUCTS CORP., 1341 Clark St., Racine, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1584

The Back of This Keyway Broach by DuMont is ground to fit the radius of the bore in which it will cut and the broach body thereby supports itself in the hole, requiring no

guides or bushings. Sizes and specifications are in a bulletin from the manufacturer, The DuMont Corp., Greenfield, Mass.
Circle Inform-A-Gram No. A23.

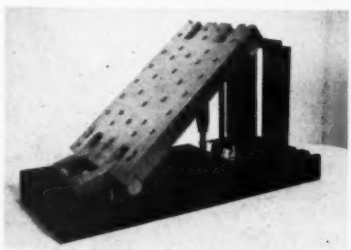
Burrs are Quickly and Easily Removed from drilled holes with the Nobur Tool, which is held in any machine spindle. Parts can be deburred as fast as they can be han-



dled. Literature from Nobur Mfg. Co., 717 N. Victory Blvd., Burbank, Calif., shows how the tool works and gives specifications. **Circle No. A24.**

RACC is a Water-Soluble, non-corrosive, non-souring all-purpose coolant concentrate. Technically it is a thixotropic emulsion of pure mineral oil. It can be used full strength for tapping or reaming or for work on a horizontal machine, and diluted for other machining operations. Riesen Chemical Corp., 419 W. Vliet St., Milwaukee 12, Wis., manufactures RACC.
Circle Inform-A-Gram No. A25.

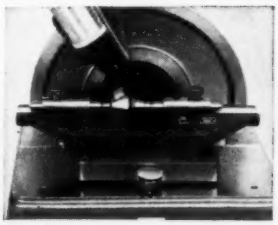
This New Sine Plate is cast of stable, high strength, shock absorbing Meehanite metal and ground to close tolerances for parallelism between the top surface and the centerline of the hardened and ground



steel rolls. Its special clamp squares the plate with the machine tool table as well as clamps the pivot for greater rigidity. Denco Machine Products, Dept. TP, 1240 S. Prairie Ave., Hawthorne, Calif.
Circle Inform-A-Gram No. A26.

Best Check for
Parallelism...
Squareness...
Angles...

Perkin-Elmer's Optical
ANGLE COMPARATOR



Checking taper angle (above). Checking micrometer for parallelism of anvil and spindle faces, thread runout and frame alignment (above, right).

Simplifies and speeds inspection of parts, even though difficult to approach by other means. Measurements read directly from graduated reticle. Operates entirely on optical principles—no physical contact with part required—precision is independent of the operator.

For descriptive booklet write:
The Perkin-Elmer Corporation, 818 Main Ave., Norwalk, Conn.

PERKIN ELMER
Optical Tooling for the Modernized Machine Shop

CIRCLE INFORM-A-GRAM KEY NO. 1591

REID QUALITY TOOL-ROOM ACCESSORIES AT MODERATE PRICES!

CAST IRON HAND WHEELS
Solid Web and Counter Balanced

DISHED STRAIGHT COUNTER BALANCED

Made of fine grain cast iron. Center hole and faces of hub are true to rim. Rims and handles are ground and polished to high lustre. Top quality. Low prices. Many sizes. Immediate delivery. Alterations when required at nominal prices.

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REID TOOL SUPPLY CO. Muskegon Heights, Mich.

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Stops Losses
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With DYKEM Steel Blue
Without DYKEM Steel Blue
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
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2303L North 11th St. • St. Louis 6, Mo.

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PHOENIX BRAND
TRADE MARK REG. U.S. PAT. OFF.

NON-SCALING COMPOUND
MAKES TROUBLE-FREE HEAT TREATING AS EASY AS A B C

A quick coating of this dry, easily handled powder and the piece is ready for the furnace.

Begin to harden or anneal piece as usual. Phoenix Brand Non-Scaling Compound forms a protective coating—completely sealing out air.

Coating comes off quickly, easily after treating. If necessary, boil in plain water to remove.

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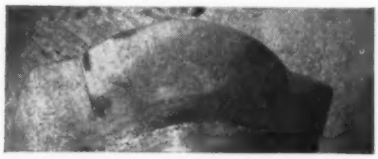

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Discover the time saving, money saving benefits of Phoenix Brand Non-Scaling Compound—order a trial supply *today!*

2 lb. can	$6.00
5 lb. can	$15.00
15 lb. can	$41.25
25 lbs. or more . .	$2.50 per lb.

AVAILABLE FROM YOUR LOCAL DISTRIBUTOR OR

THE PARKER STAMP WORKS, Inc.
ESTABLISHED 1871
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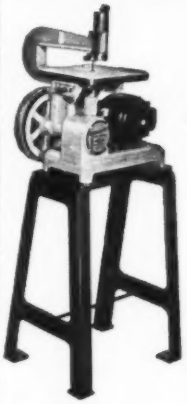
CIRCLE INFORM-A-GRAM KEY NO. 1601

CUT TOOL AND DIE-MAKING COSTS WITH . . . Milwaukee DIE FILERS PROFILE GRINDERS



DIE FILERS
. . . for straight-line sharp corner filing, sawing and lapping

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

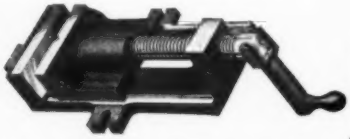
Write for illustrated Bulletins and Prices

PROFILE GRINDERS
. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

RICE PUMP & MACHINE COMPANY
228 PARK AVENUE BELGIUM, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1602



YOST DRILL PRESS VISE

• This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type? *Write today for bulletin on the extensive Yost line*

YOST MFG. COMPANY
1000 MAIN STREET
Meadville • Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 1604

Economy
. . . Another Word For ACCURACY

PLUS ATTRACTIVE PRICE

For your duplication requirements in standard items, be sure to specify "ECONOMY" . . .

★ "TRU-LOC" Adjustable Adapter Sleeves & Nuts
★ A. S. A. DRILL JIG BUSHINGS
★ A. G. D. PLUG & RING GAGES

Always in stock to assure you immediate delivery.

Ask about our prices for salvaging your worn-out plug and ring gages.

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Economy TOOL & MACHINE CO.
1828 S. 68th St. • Milwaukee 14, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1603

SAVE $10,000.00 in perishable tool inventory with HAYDEN ADJUSTABLE DRILLS

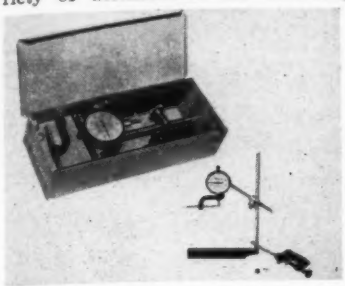
Only two ordinary drills, 1" and 2", needed in stock for hogging out metal. A Hayden Adjustable Drill will then cut the hole to its specified size. Adjustable drills come in two sizes, 1" to 2"; 2" to 4". Blades are high speed steel. Carbide tipped blades at extra cost. Write for Literature and Price List.

DOUBLE LOCKED

HAYDEN TWIST DRILL CO.
8628 Lyndon Ave., Detroit 38, Mich.

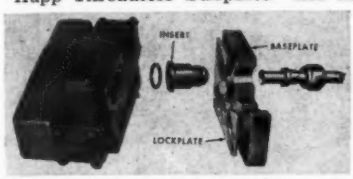
CIRCLE INFORM-A-GRAM KEY NO. 1605

The Geneva Dial Indicator Test Set — a compact, precision checking unit for machinists, tool makers, and inspection departments — consists of one Geneva dial indicator and a variety of attachments for checking



parts in almost any position. The set is packed in a sturdy metal box for portability and dust-free protection. Chicago Dial Indicator Co., Dep't A, 180 N. Wacker Dr., Chicago, Ill., or — **Circle No. A27.**

A Threadless Subplate for gasket mounted hydraulic valves that eliminates pipe threads in both body of valve or in subplates is announced by Petch Mfg. Co., 461 York, Detroit 2. The key to the design of the "Hupp Threadless Subplate" lies in



the bar stock steel insert (the only part of the assembly subject to direct hydraulic pressure) which combines the sealing face for the "O" ring, the fluid passage through the subplate, and the tube fitting connector body.
Circle Inform-A-Gram No. A28.

A New Air-Controlled Collet Closer, designed to replace hand levers and hand wheels in opening and closing collets on engine and turret lathes of 1" bar stock capacity, is operated on the principle based on a stationary oil-resistant innertube

that is inflated by air to operate the collet-closing mechanism. The unit helps eliminate work slippage and damage to delicate parts. Get details from Wilson Air Collet Closer, Inc., 909 40 Ave. N.E., Minneapolis 21, Minn., or —
Circle Inform-A-Gram No. A29.

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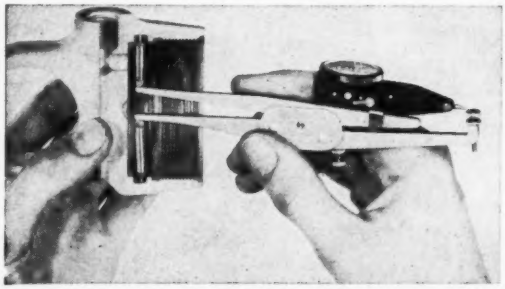
INDI-CAL (Indicator-Caliper) "O" RING & BORE GAGE



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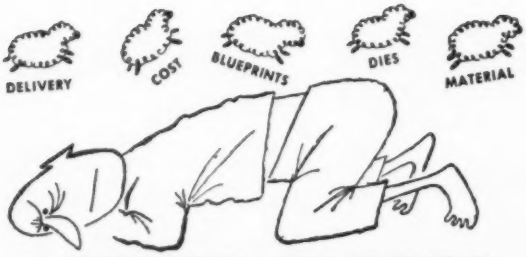

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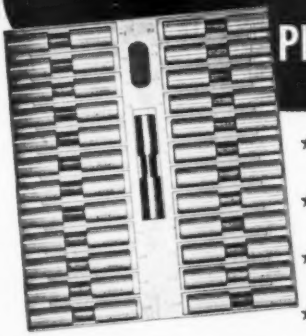
CLOSER TOLERANCES with DELTRONIC TENTH PLUG GAUGES



★ Size variation by ten thousandths
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★ Hardness is Rockwell C62/C64

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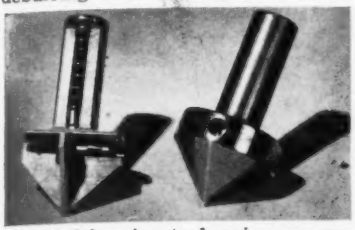
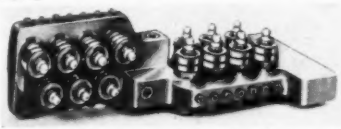
A Controlled Feed or Thickness of the chip being removed is obtained by regulating the protrusion of the cutter blade beyond the body of this deburring tool. It may be used as



a hand deburring tool or in any machine that is capable of rotating the tool at the surface speeds recommended for the material being machined. Randles & Reynolds Machine Co., Alpena, Mich.
Circle Inform-A-Gram No. A30.

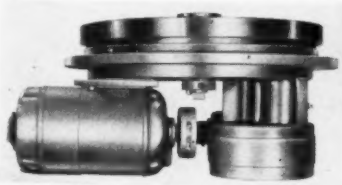
A New Compact Wire Straightener designed to straighten small sizes of wire below 0.062" dia. has been added to Durant's line of press room equipment. The unit has seven



straightening rolls in each plane and each roll is mounted on needle bearings and is individually adjustable. Durant Tool Supply Co., 136 S. Water St., Providence, R. I.
Circle Inform-A-Gram No. A31.

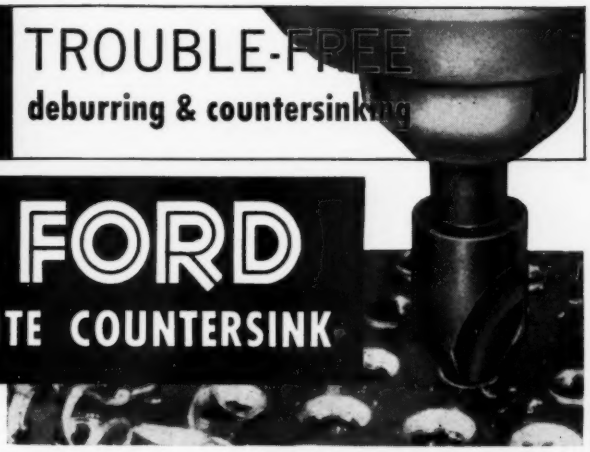
Two Transducers for all rates of mechanical movement are the Magnetic Pickup and the Proximity Pickup systems developed by Electro Products Laboratories, 4501 N. Ravenswood Ave., Chicago 40. The Magnetic Pickups convert mechanical motion to a-c electrical energy to indicate the rate of motion at all speeds without mechanical contact. The Proximity Pickup system is for counting and positioning very low speeds to and including zero; the Magnetic, for medium or high speeds.
Circle Inform-A-Gram No. A32.

The New Cleveland Power Driven Index Tables are operated by a Geneva drive, using a needle-bearing cam follower operating in ways faced with hardened and ground tool steel wearing plates. Its tool



steel lock pin, actuated by a cam plate, enters the ways before the cam follower leaves so that it cannot be free-wheeled. The Cleveland Tapping Machine Co., Canton, Ohio.
Circle Inform-A-Gram No. A33.

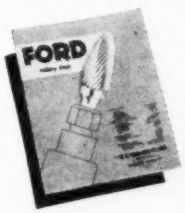
NOW TROUBLE-FREE deburring & countersinking with the NEW FORD UNIFLUTE COUNTERSINK



Engineered for maximum efficiency with simple *single flute design*, FORD'S new high speed steel Uniflute *ends all deburring and countersinking troubles* on soft stringy steels, aluminum, brass, bronze, plastic, rubber, wood and other materials. FORD'S new HSS Uniflute covers a *wide range of hole sizes with one diameter tool.* Its cutting action is effective from the working point to the major diameter. Job-engineered shear angles allow superior free cutting, insure trouble-free action, even at higher speeds.

FORD regrinding service adds tool life, reduces tool costs!

FREE information • **Bulletin HSS 408** gives complete information about Ford's new Uniflute countersink, plus easy 4-step instructions on how you can resharpen the Uniflute in your own tool room.



Catalogue No. 207 gives all facts on more than 277 FORD rotary tools including HSS ground cutters, rotary files, countersinks; CARBIDE cutters, end mills, grinding burs. **Send today!**

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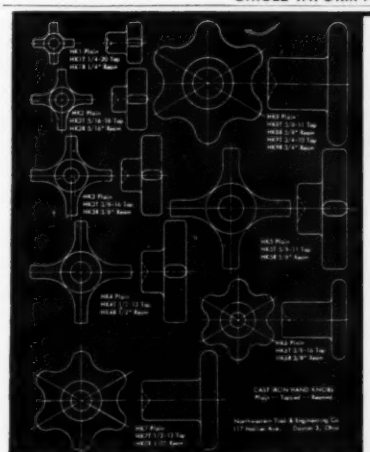

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CIRCLE INFORM-A-GRAM KEY NO. 1632

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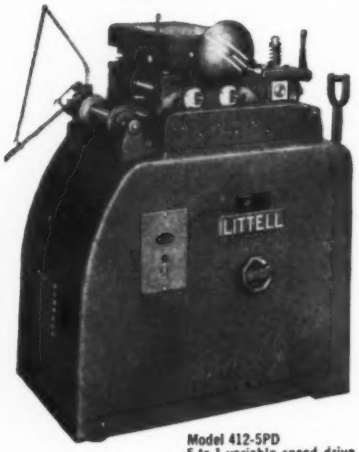
coil stock

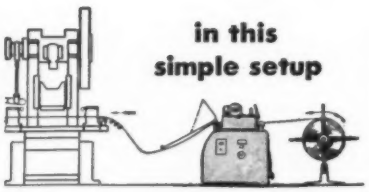
converted to workable

flat stock

by a LITTELL Variable Speed Straightener



Model 412-5PD
5 to 1 variable speed drive
Straightens steel stock up to .125" thick x 12" wide.



in this simple setup

Coil stock comes out of a Littell Straightener commercially *flat*, in perfect condition for accurate, automatic, high speed work on punch press, shear or slitter. The right straightener for your requirements is in the complete Littell line. *Write for the Littell Straightener Catalog*

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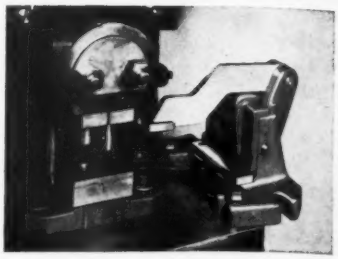

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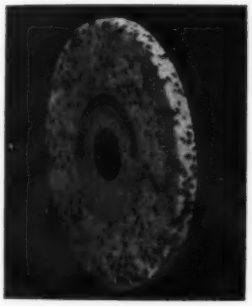
With Only Two Chucks this drill grinder will sharpen small drills from 0.012" to 0.240". Guaranteed concentric accuracy of sharpened drills is 0.0004". No resetting is needed for grinding different diameters or types of drills. Get detailed information from Alina Corp., 401 Broadway, New York 13, N. Y., or — **Inform-A-Gram No. A35.**

Horton's "True-Set" Chuck, with guaranteed accuracy of 0.0002" TIR, features micro-screw adjustment of the chuck back, enabling operators to align the workpiece practically within the limits of the accuracy of the lathe. The Meehanite-bodied chucks are available with either three or six jaws from Horton Chuck Div'n of The Horton & Son Co., Windsor Locks, Conn. **Inform-A-Gram No. A36.**



The "MM" Process of distributing fine grain aluminum oxide abrasive throughout the wheel for a constant flow of abrasive between the wheel and the work is of special value for difficult carbide grinding operations. The self-dressing wheels are for surface grinding and have been applied successfully to internal and external grinding as well. Macklin Co., Jackson, Mich. **Inform-A-Gram No. A37.**

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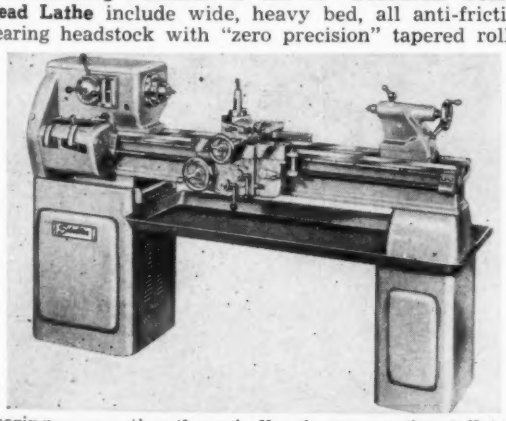
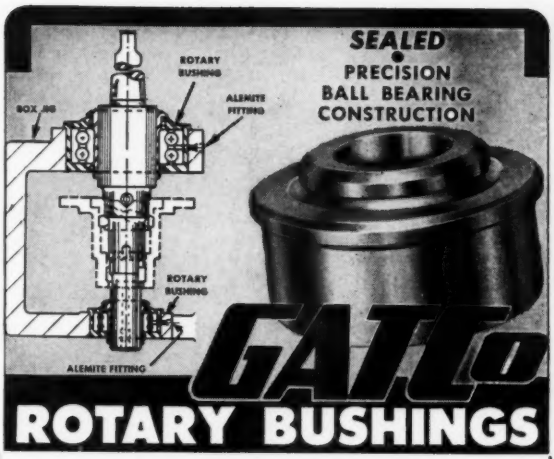


bearings supporting the spindle, the cam action tailstock clamp, and easy shifting spindle speed dial. Get details in a circular from Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 44, Ill. **Inform-A-Gram No. A38.**



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50,000 R.P.M.
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IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

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ARC-FIT TWIN-NOTCH

NO DEFORMATION Shears from inside out—cuts clean edges; eliminates need for further finishing; aligns notches automatically.

PERFECT "T" Joints for welding or brazing.

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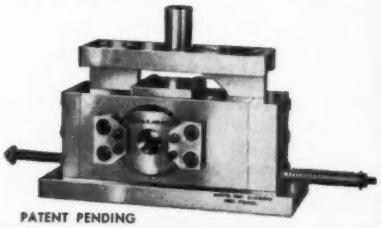

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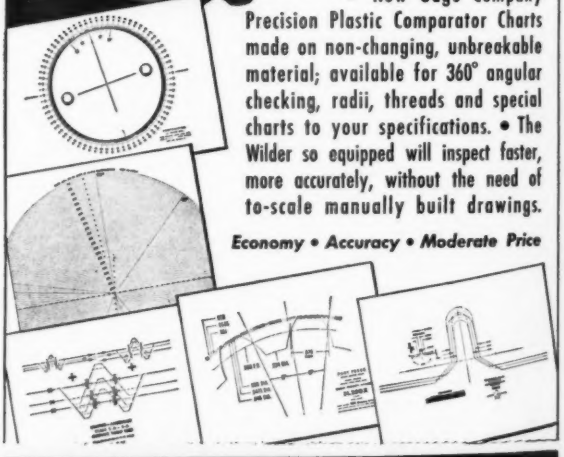
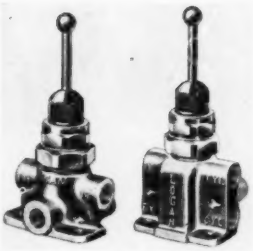
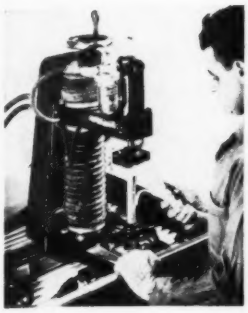


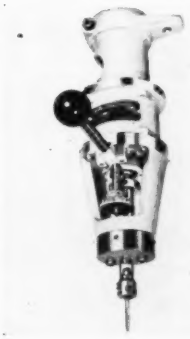
Geo. SCHERR OPTICAL TOOLS, Inc.
200 -T LAFAYETTE STREET • NEW YORK 12, N. Y.
CIRCLE INFORM-A-GRAM KEY NO. 1663



Three Air Control Valves with locking toggle are announced by Logansport Machine Co., Inc., Logansport, Ind. Model 6664 is for control of bleeder and pilot-operated master valve; Model 6665 has two exhaust openings which permit bleeding both ends of the master valve alternately; and Model 6676, a fourway unit, is for manual control of double-acting air cylinders. **Inform-A-Gram No. A39.**

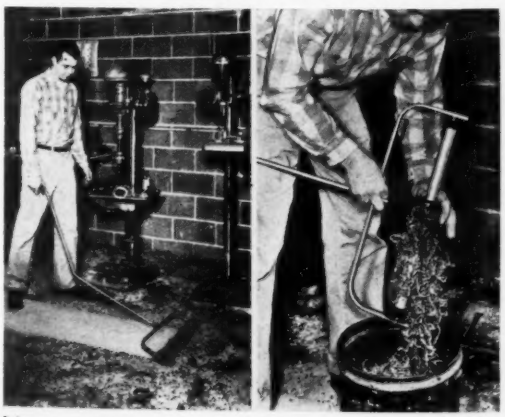


This Vertical Contact Adaptor, the X-1584, fits any standard horizontal Magnaflux unit and acts as a special jig for faster magnetic inspection of small ferrous metal parts. The magnetizing current and clamping head are controlled in the same way as they would be on the horizontal unit. Get details and information on applications from Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill., or — **Inform-A-Gram No. A40.**



This Lead Screw Tapper combines the Procunier cork-faced friction clutch and Tru-Grip tap holder with a newly designed lead screw assembly. Complete control of the manually or air-operated unit is in the lead screw assembly and positive depth stops which function independently of the operator. For complete details, contact Procunier Safety Chuck Co., 16018 S. Clinton St., Chicago 3, or — **Inform-A-Gram No. A41.**

The New Rotary Magnetic Broom introduced by the Magnetool Div'n of Multifinish Mfg. Co., 26341 W. 8-Mile Rd., Detroit 19, utilizes a permanent, rotating-cylinder magnet and is operated like a domestic carpet sweeper in



picking up screws, nuts, chips, scraps, etc. The scrap load is released by sliding a neoprene unloading ring from one end of the cylinder to the other.
Circle Inform-A-Gram No. A42.

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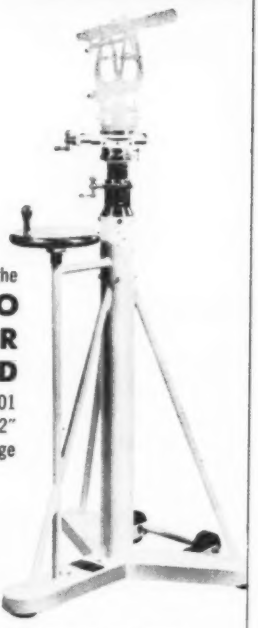

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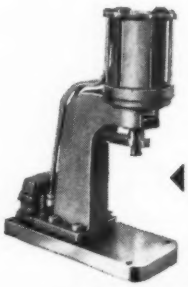

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6 Tons (Model B-2) One of more than 30 models. Press with base, $554.

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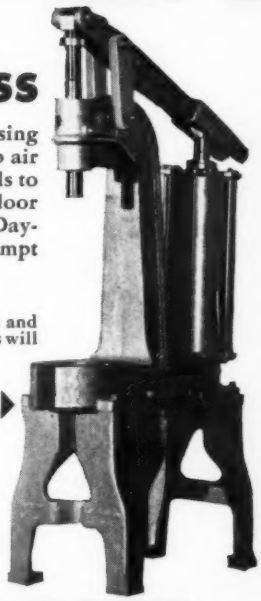

Prices F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

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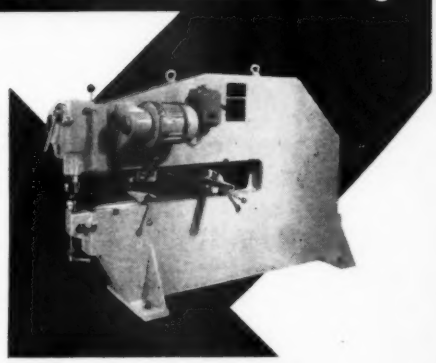

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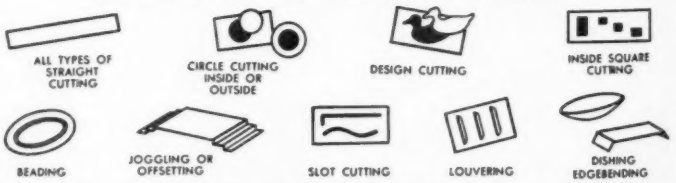

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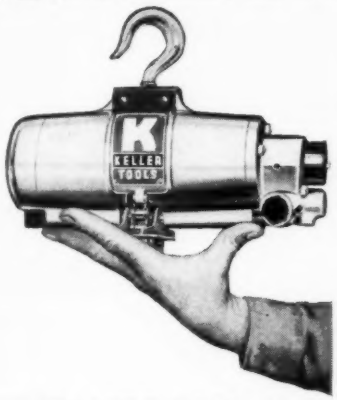
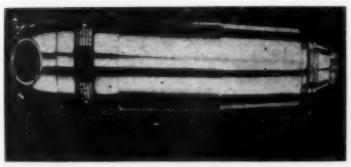
The Newest Keller Air Hoists, called "High-Rate-Of-Lift" models, have capacities of 500 and 1,000 lbs while providing a lifting rate of 35



fpm. The 1,000-lb hoist is noted for its ready portability. Complete information is available from Keller Tool Div'n of Gardner-Denver, Grand Haven, Mich., or —
Circle Inform-A-Gram No. A43.

All New Super 60 Power Quill has a ½-hp motor and is capable of operating at speeds as high as 45,000 rpm. Mounted in various standard machine tools, the Power Quill often does the work of expensive, single-



purpose machine tools, including internal and external grinding, micro milling, form and cam grinding and milling, small diameter drilling and numerous other operations. Precise Products Corp., 1328-30 Clark St., Racine, Wis.
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Spiro Sanding Discs, incorporating a patented spiral design which sets concentric abrasive areas between sanding areas, are waterproof, easily

cleaned, and will never dry out. They throw off dust and grit at a tangent to the right and to the floor. Spiro Div'n of National Gas Equipment Co., Denison, Texas.
Circle Inform-A-Gram No. A45.

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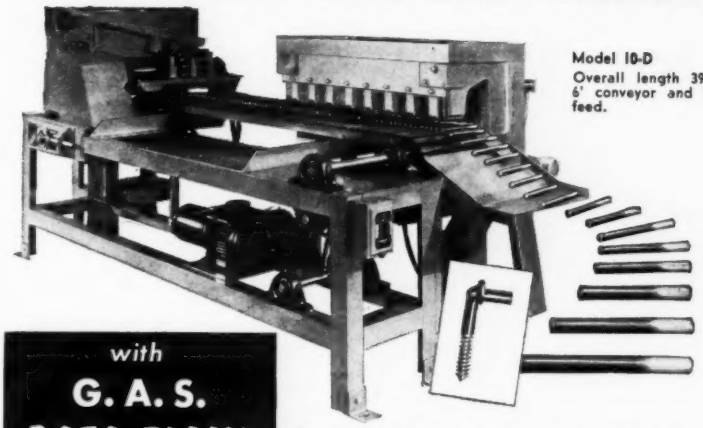

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Overall length 39" with 6' conveyor and hopper feed.

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  — by eliminating long heat-up periods
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  — through longer die life
  — through savings in floor space
- **An improved product:**
  — by eliminating objectionable scale
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  (fast heating improves plasticity of metal)

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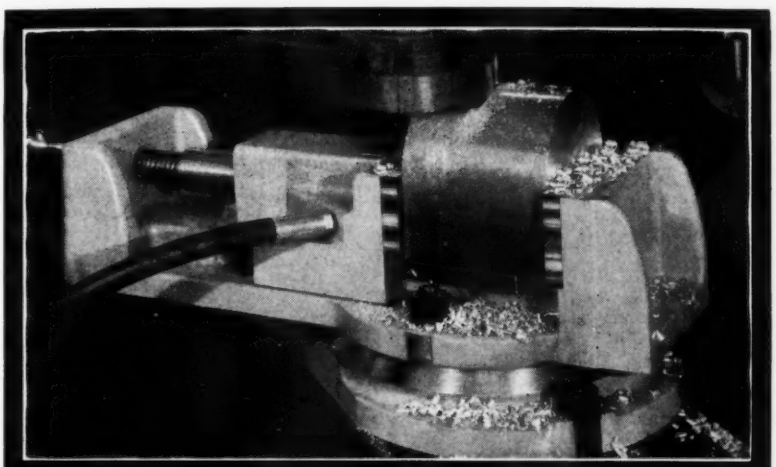

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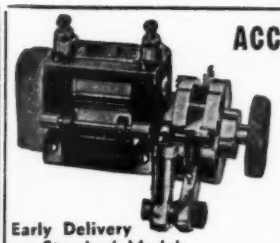

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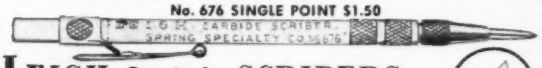

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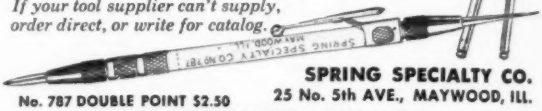

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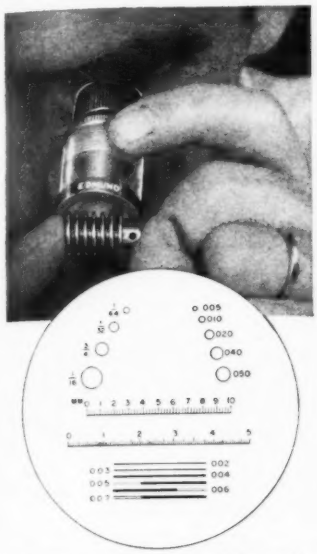

glass reticle and the reticle pattern is designed to compare hole diameters as well as take linear measurements. Edmund Scientific Corp., Barrington 3, N. J.
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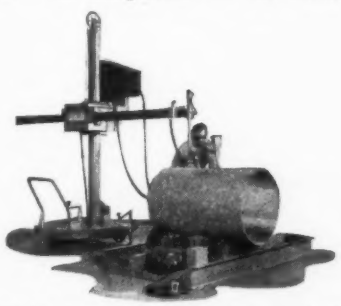
Convert a Semi-Automatic Submerged Melt Weld Head into a highly productive tool for laying a weld without manual assistance with the Panjiris Semi-Automatic Manipulator. An adaptation of an earlier



model, the unit is easily demountable and wheels may be left on the cabinet for manual applications. Panjiris Weldment Co., 5151 Northrup Ave., St. Louis 10, Mo. **Circle No. A48.**

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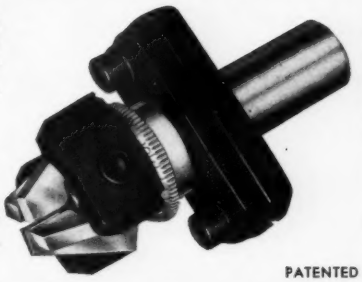

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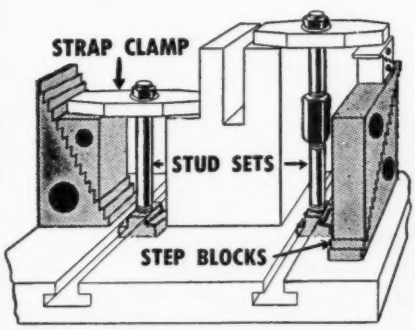

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AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED
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- SPECIALLY LONG VERNIER to read thousandths
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High and unnecessary die making costs will be eliminated . . . production schedules and higher product standards maintained . . . when you equip your toolroom with OLIVER DIE MAKING MACHINES. With an Oliver in your service, smoother production will be assured . . . higher output certain . . . lower die making costs a fact!

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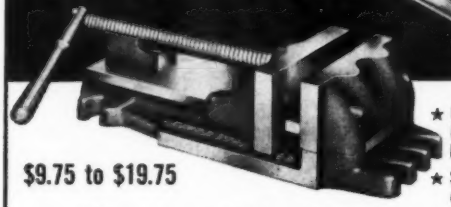
SPEED VISE
GIVES YOU
100 JIGS IN ONE



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★ Lift...slide...lock...that's all there is to the fast, positive locking action.
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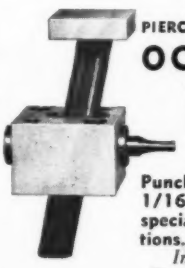
CIRCLE INFORM-A-GRAM KEY NO. 1724

FOR SIDE HOLE PIERCING OR FORMING USE

OCTOCAMS
(pat. pend.)



OCTOCAM pays for itself through savings in toolmaking time.

Punches available from 1/16" to 1/2". We build specials to your specifications.

Immediate Delivery
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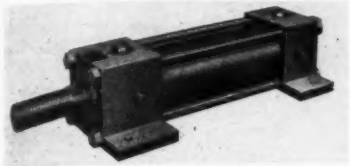
OCTAVIA TOOL & GAGE CO.
3320 N. Kedzie Ave. -:- Chicago 18, Ill.

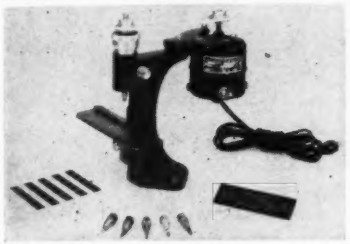
CIRCLE INFORM-A-GRAM KEY NO. 1725

A New Series of Automation Cylinders for air pressures up to 200 psi or hydraulic service up to 2,000 psi has been announced by Automation Products Div'n, Bill-Dee Corp.,



405 Crystal Lake Rd., McHenry, Ill. The new type cup seals used on piston and rod assure positive sealing at low pressures and heavy web sections give the strength required for sealing pressures up to the psi limits. **Circle Inform-A-Gram No. A49.**

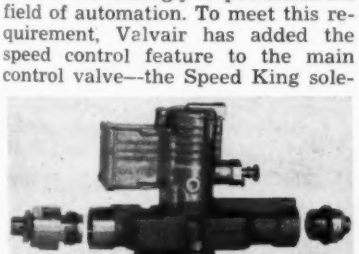
The Mico Nameplate Edger is equipped with a micrometer spindle assembly so that complete cutter control is possible for the type of nameplate bevel required. Shown is



the edger with typical cutters and some laminated phenolic nameplate blanks. Mico Instrument Co., 88 E. Trowbridge St., Cambridge, Mass. **Circle Inform-A-Gram No. A50.**

Heavy Duty Tumbling Barrels with horizontal closed drums for total capacities ranging from 7½ to 45 cu ft have been designed by Tumbling Sales & Service Co., Greenwich, Conn. Special features include overhead, variable speed drive; fast acting safety doors; and low loading height. **Circle Inform-A-Gram No. A51.**

Speed Control of Cylinders has become increasingly important in the field of automation. To meet this requirement, Valvair has added the speed control feature to the main control valve—the Speed King sole-



noid pilot operated valve—eliminating the need of separate flow control valves. A kit for converting valves already in service is also available. Valvair Corp., 454 Morgan Ave., Akron 11, Ohio. **Circle Inform-A-Gram No. A52.**

Tomco

HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

Specify Tomco for long lasting dependability

A complete line of high grade hand knobs, handles, and hand wheels is available from Tomco. Immediate shipments are made from stock of standard items. Specialty items are made to your specifications.

For original equipment or replacement parts look to Tomco for quality and service.

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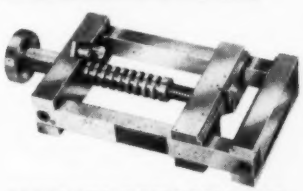
Blank or Machined—from stock
CIRCLE INFORM-A-GRAM KEY NO. 1731

ESSENTIAL



PRODUCTO TOOLROOM VISE

Producto's Precision Toolroom Vise is essential equipment for your jig borers, surface grinders, drill presses, tappers. It's extremely strong, yet weighs only 13 lbs. and has a 2" high frame. Has large jaw opening, will clamp heavy as well as light workpieces. All surfaces hardened and ground. Works on five surfaces. Write for Bulletin TE2-103.

THE PRODUCTO MACHINE CO.
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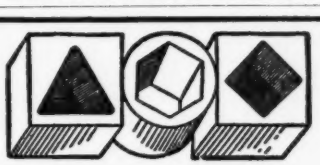
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1732

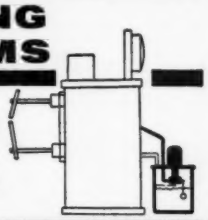


DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.

CIRCLE INFORM-A-GRAM KEY NO. 1733

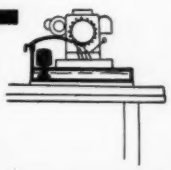
LOOK at these money saving IDEAS WITH GRAYMILLS PUMPING SYSTEMS

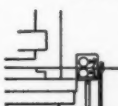
INEXPENSIVE COOLANT SYSTEM
Saves Spot-Welder Tips
—No waste water—
Complete **$57.50**



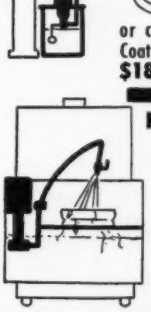
NEW GRAYMILLS COOLANT PUMPS—
BIG PUMP Performance in less space. Discharge above self-mounting flange. Abrasive proof, too. Ask about the new H-6000 Series pump.

COOLANT SYSTEM FOR BENCH MILLS—
longer tool life. Quick, easy conversions. Short pump does the trick.
$33.80 less pan





LUBRICATE and CLEAN COIL STOCK AUTOMATICALLY
Graymills Stocklube System applies oil or compounds. Cleans stock. Coats top and bottom. Approx. **$188.00** complete



HERE'S A SAFER WAY TO CLEAN TOOLS, DIES and PARTS
that are handled individually. Graymills AGITOR flushes parts clean, with filtered solvent. From **$59.75** to **$224.50**

SEND FOR "IDEA" BOOKLET that shows how GRAYMILLS Coolant Systems are used effectively on many other machines not shown here.

GRAYMILLS CORPORATION
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LUCAS TOTE PANS

HELP SOLVE PRODUCTION PROBLEMS!

Lucas Tote Pans are built for long wear and ease of handling. Designed for every shop use—storing materials, holding parts for convenient handling by machine operators and at assembly lines. Lucas Tote Pans are available in nesting type, stacking type, straight side and assembly or bench pans. Lengths from 10" to 32", widths from 5" to 23" in standard sizes. Other sizes made to your specifications.

For Further Information, Write

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HARDENED and GROUND HSS BLANKS

Any decimal diameter to 5/8"—in any length.
Mirror finish surface to gage tolerance.
Many uses—
—core pins, punches, gages, ejector pins, insert pins, special tools, etc.—Quick delivery.

Write or phone MIllburn 6-4222 for price list D-3

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P.O.B. 328, UNION, N. J.
Factory: Springfield, N. J.

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Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel.

- Permanently Accurate
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- Faster—Easier to use
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in inch grams...inch ounces...inch pounds ...foot pounds (All sizes from 0-6000 ft. lbs.)

Every manufacturer, design and production man should have this valuable data. Sent upon request.

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MICRO-HEIGHT GAUGE

BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

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Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Toolmakers, Layout men, and Inspectors do better work faster with Micro-Height Gauge.

Write for illustrated circular and prices.

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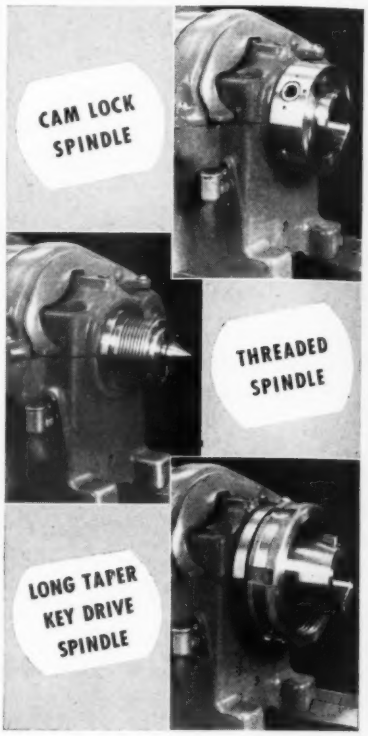
CIRCLE INFORM-A-GRAM KEY NO. 1744

Your Choice 3 TYPES OF SPINDLES ON SOUTH BEND LATHES



Extra Charges for Types L and D1 Spindle Noses

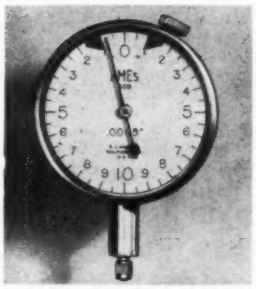
Lathe Size	Long Taper Type L Size 00	Cam Lock Type D1 Size 4"
10" — 1" C & Ser. 1000	$25.	$33.
13" — 1" Collet	38.	38.
14½" — 1" Collet	46.	46.
16", 16-24", 2-H	52.	52.

Greater interchangeability of chucks, collets and fixtures are yours with South Bend Lathes. All 10" — 1" Collet and larger lathes can be supplied with 4" Type D1 Cam Lock Spindles, Size 00 Type L Long Taper Key Drive Spindles or the regular threaded spindles as shown. Keep this in mind when buying lathes so you can better take advantage of the extra values you get in South Bend. Write for complete information on South Bend Lathes — also Shapers, Drill Presses, and Pedestal Grinders.

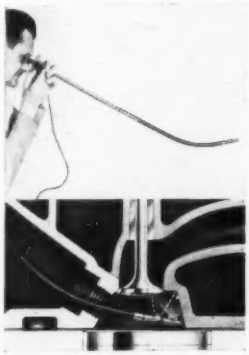
SOUTH BEND LATHE
South Bend 22, Indiana
Building Better Tools Since 1906

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941
WAGES UP 155%
MATERIALS UP 131%
PRICES UP ONLY 49%
Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.
SOUTH BEND LATHES

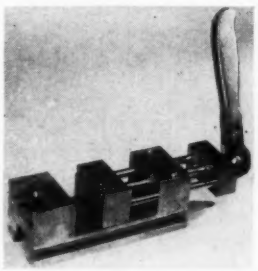
CIRCLE INFORM-A-GRAM KEY NO. 1745



These New Tolerance Hands, for use on Ames' line of micrometer dial gages and indicators, are located directly above the dial, under the crystal, which makes the pointers easier to see and eliminates distortion in reading. It also prevents the hands being moved accidently. B. C. Ames Co., Waltham 54, Mass.
Inform-A-Gram No. A53.

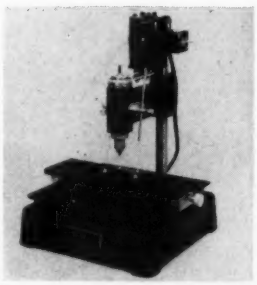


The Eder "Inspectroscope" has a mirror at the objective window which can be adjusted to prograde and retrograde angles. The patented controlled mirror allows examination of areas which cannot be seen with other models and its strong light illuminates the area being examined. Eder Instrument Co., 2293 N. Clybourn, Chicago, will send you complete information, or —
Inform-A-Gram No. A54.



A Flexible Vise for production and general use, the CF Quick-Action Vise, featuring a patented locking handle that requires only a slight turn to release or lock the jaws, has been announced by Carruthers & Fernandez, Inc., New Products Div'n, 1501 Colorado Ave., Santa Monica, Calif. Jaws on the hardened steel vise open to 2½".
Inform-A-Gram No. A55.

A New Series of Automatic Temperature Control Cabinets, under the name "Robotemp," is announced by A. Daigger & Co., 159 Kinzie St., Chicago 10. A sensitive, adjustable thermostat with sealed hydraulic elements governs the heating bank directly with no dependence upon relays. Glass wool insulation in the door and surrounding the working chamber conserve heat and eliminate radiation.
Inform-A-Gram No. A56.



This Precision Drill Press Head with mounting post, shown attached to one of the standard Mico pantograph engraver bases to utilize the holding fixtures of the base, was developed for small hole drilling applications where an accurate, high speed drilling machine should be used. Ask for information on the No. 900 head from Mico Instrument Co., 88 E. Trowbridge St., Cambridge, Mass., or —
Inform-A-Gram No. A57.

CIRCLE INFORM-A-GRAM KEY NO. 1751

TOGGLE
CADDY
CLAMPS
HEAVIER LINKS AND HANDLE
Pipe extension handle cannot damage clamp.
HEAVIER FRAME
Cannot spring or bend under maximum load.
ALL WELDED CONSTRUCTION
Outlasts stamped type clamps 5-1.
EXTRA LARGE PIVOT PINS
300% more bearing surface than other clamps.
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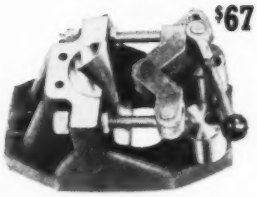
2070 E. 61st PLACE • CLEVELAND 3, OHIO
CIRCLE INFORM-A-GRAM KEY NO. 1752

LASSY **WORK HOLDERS**

PATENTED

1. SAVE HUNDREDS OF TOOLING $$$$$$
2. CONVERT TOOLING TIME TO PRODUCTION TIME
3. INCREASE PRODUCTION AND QUALITY

Plus! LOW INITIAL COST. NOTHING ELSE LIKE IT.



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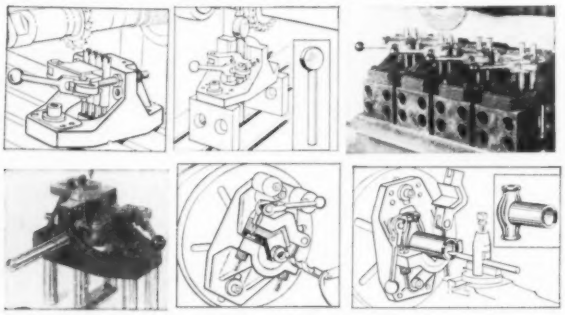
Model P2 Cap. 1/8" to 2" Other Models and Sizes to 4" Cap.

Just a few of the many setups that can be made rapidly with Multi purpose Work Holders and STANDARD LOW COST Accessories



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LASSY TOOL CO., Plainville, Conn.

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TOOLING and PRODUCTION
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PRESSURELOK-224

the best diamond wheel ever developed for carbide tool grinding. Guaranteed ultimate cutting life from each diamond particle in every wheel.

UNITED STATES DIAMOND WHEEL CO.
1833 ILLINOIS AVE. AURORA, ILL.

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IMMEDIATE DELIVERY on all wheel sizes. STRAIGHT, DISH, CUP, FLARE and MOUNTED WHEELS; HONES.

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CARBIDE TOOLS
Precisionized by
GRAWELL

Grawell craftsmanship is inherent in Grawell Solid Carbide Tools . . . years of experience is reflected in the precision and long service life of these fine drills, end mills, reamers, grinding tools, centerlaps and burrs.

WRITE FOR NEW CATALOG TODAY DEPT. TPS

GRAWELL CARBIDE TOOL COMPANY
5680 12th ST., DETROIT 8, MICH.

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JACO LOW COST AUTOMATIC

STOCK REEL

COSTS NO MORE THAN STANDARD STOCK REELS

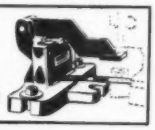
POWERED BY THE NATURAL SPRING OF UNCOILING STOCK

3 SIZES — ALL WILL TAKE 6" WIDE STOCK.

24" diameter $85.00
30" diameter $89.00
36" diameter $95.00

Guaranteed — money back if not 100% satisfied

New LOW prices on the JACO 3-inch and 6-inch SCRAP CHOPPER



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Dealer Inquiries Invited

JACO DEVICES, INC.
96 High Street Hingham, Mass.

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Expanding Mandrels

Accuracy 001" - No Distortion

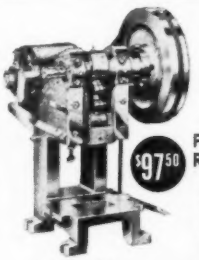
No Slipping - Everlasting

K.O. LEE CO.
ABERDEEN, SOUTH DAKOTA

If it's made by **Lee** *it's a* **"Knock-Out"**

CIRCLE INFORM-A-GRAM KEY NO. 1765

CUT COSTS
WITH
ALLEN PUNCH PRESS



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2 Ton Power Bench Type

Powerful—Dependable—Economical

For Light Work — Stamping, Forming, Riveting—Metal, Fiber or other material. Overall height 20¼"—Base size 9" x 8¼". Die bed 6¼" x 8"—Ram face 1½" x 3½". Ram stroke ¾"—Positive ¾" ram adjustment. Sturdy, Single pin, non-repeat hand lever clutch. V-belt drive—Weight 105 lbs. Requires only 1/3 H.P. motor. The machine of a thousand uses! Adequate for many types of work now done on large presses at greater expense.

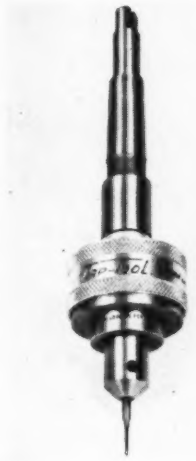
FULLY GUARANTEED

Order Today. Price $97.50 fob Clinton, Missouri. Includes motor bracket, V-Belt and motor pulley. (Less motor)

FREE CIRCULAR
Dealer Inquiry Invited

ALVA F. ALLEN, Dept. TP, Clinton, Missouri

CIRCLE INFORM-A-GRAM KEY NO. 1766

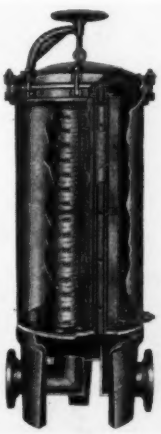


A Newly Designed "Tap Tool" for high speed, super sensitive tapping of 0-80 to 4-40 holes in steel and other metals and plastics has been placed in production by Armite Laboratories, 6609 Broad St., Los Angeles 1, Calif. It consists of a Morse No. 2 tapered shank with a telescoping spindle to provide for vertical travel, a knurled control collar to provide maximum "feel" of the operation, and a lock screw arrangement which engages an overload clutch for small taps and disengages for No. 2 and 4 taps.
Inform-A-Gram No A58.

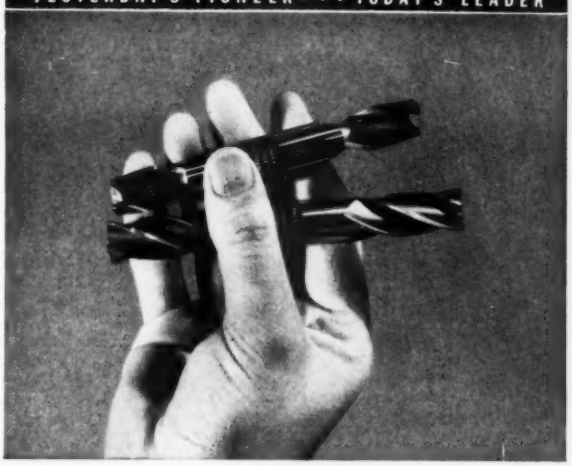
Perforated Stainless Steel Baskets in the NesTier line combine the strength and rigidity of the standard sheet steel NesTier box with the rapid draining and easy cleaning features of the basket. Their design permits handling parts or products throughout all production operations in the same container. Chas. Wm. Doepke Mfg. Co., Inc., 8911 Blue Ash Rd., Rossmoyne, Ohio, or —
Inform-A-Gram No. A59.

A New Forming Guide that makes possible the precision engraving of calibrated machine control dials, etc. on convex or cone shapes—even with two-dimensional engraving machines—is announced by H. P. Preis Engraving Machine Co., 647 U. S. Route 22, Hillside, N. J. The guide consists of an arm and a hardened steel form block.
Inform-A-Gram No. A60.

These Full Flow Filters are designed for in-line installation, combining compactness with high low capacity to insure continuous filtration of the entire oil, coolant, or solution supply. Nine sizes are available using one to 36 cartridges. Extra-large dirt holding capacity is obtained by the new "Flo-Pac" cartridge which is completely inert and will not remove additives found in many oils. Filtration Div'n, Houdaille-Hershey of Ind., Inc., 248 Superior Ave., Lebanon, Ind., or —
Inform-A-Gram No. A61.



YESTERDAY'S PIONEER · · · TODAY'S LEADER



WELDON

Double-End End Mills

FOR DOUBLE DUTY

Weldon Double-End End Mills originally developed by Weldon give you double the service for much less than the cost of two single end mills of equal size. They save production time, too, because to change the mill you simply turn it end for end.

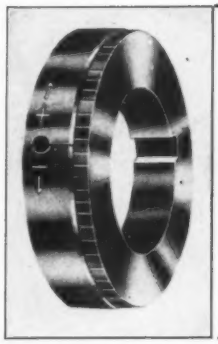
Weldon leadership in the cutting tool field has been achieved by many original features which contribute to faster, better performance and longer tool life.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KE NO. 1771



MILLING MACHINE SPACING COLLARS

SAVE TIME

ON GANG MILLING SET - UPS

These MICROMETER ADJUSTABLE SPACING COLLARS are designed for accurate spacing of side milling cutters, gang milling and various other multiple setups on milling machines. Accurate spacing of the milling cutters is easily made by merely loosening the cutter arbor nut and making a plus or minus adjustment.

You will be assured of a QUICK, ACCURATE and POSITIVE ADJUSTMENT at all times.

For immediate delivery specify size and mail orders to . . . . . .

Size of Cutter Arbor	Maximum Outside Diameter	Price
⅞	1-9/16	$11.50
1	1-13/16	11.50
1¼	2-1/16	12.25
1½	2-7/16	12.25
1¾	2-3/4	14.50
2	3-1/16	16.50

DAYTON ROGERS
Manufacturing Company

MINNEAPOLIS 7 B, MINN.

CIRCLE INFORM-A-GRAM KEY NO. 1781

A du Mont *Minute Man* Kit like this is just the ticket when you cut occasional keyways of various sizes. You can do the job in one minute for as little as a penny a keyway — 1/16" to 1" keyways in ¼" to 3" bores.

Cut YOUR KEYWAYS in SECONDS for CENTS

For Quantity Keyway Production
"Minute Man" Production Type Push Broaches are now *available from stock.*

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"Minute Man" Square Broaches come in mighty handy — for accurate square holes in boring bars, *no* filing; for dies, jigs and fixtures; for low cost square couplings instead of expensive splines.

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MAIL FREE BROACH CATALOG AND PRICE LIST TP describing 25 standard kits, 23 standard broach sizes, 71 bushing sizes, 10 standard production-type broaches, 8 standard square broaches—all low cost, quick delivery.

Name .....

Company .....

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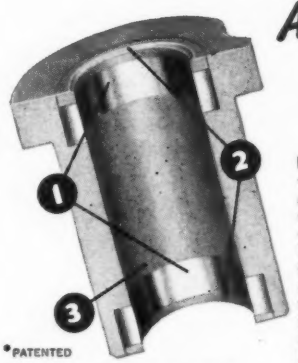
CIRCLE INFORM-A-GRAM KEY NO. 1783

MORE HOLES— MORE ACCURACY— FASTER— AT LESS COST



*PATENTED

1. Tungsten carbide rings at the points of wear; **2.** Steel rings protect drills and carbide; **3.** Special hardened alloy steel body.

For information and prices write for Meyco Bushing Catalog No. 41

MEYCO
Carbide Inserted Bushings Are Doing It Daily!

HOW? Like this: **(1)** Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; **(2)** Increased life for your drill jigs and fixtures; **(3)** Increased life for your drills and reamers; **(4)** Accuracy maintained for a LONG PERIOD of time; **(5)** Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; **(6)** Inspection time saved, because of greater accuracy for a longer time; and **(7)** Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

W. F. MEYERS CO., INC., BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1782

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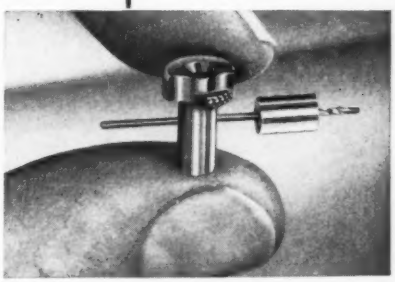
*ULTRA PRECISION BUSHINGS . . .

For gauge assemblies, flow orifices, wire drawing dies, etc. Guaranteed accuracy to .0001 in bores up to ⅜" long.

★ With Micro Drill Guides



Special Holes are Standard!

No change in price or delivery for metric and special hole sizes in STANDARD MICRO DRILL GUIDE RANGE OF #80 to 3/32" in listed body sizes.

LONGER LIFE

No counter bore . . . diamond lapped hole with full length drill bearing.

Also Available

- Special Micro Drill Guides with body sizes other than those listed and hole sizes not in the standard ±80 to 3/32" range.
- Job micro-drilling of your parts.
- Engineered MICRO-TOOLING, drills, jigs, collets, etc.

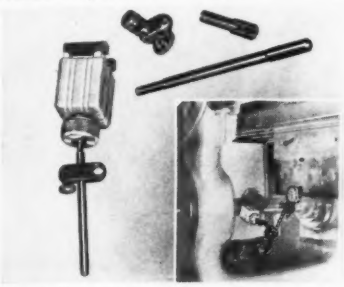
MICRO DRILL GUIDE
JEDCO
3980 SUPERIOR AVENUE CINCINNATI 36, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1784

High Speed Countersinks or center reamers with included angles of 90°, 100°, 110°, and 120°, in addition to 60° and 82°, are now available in

either high speed steel or carbon steel from Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.
Circle Inform-A-Gram No. A62.

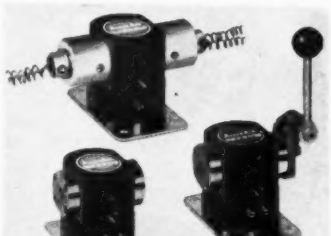
"Tiny-Titan" Magnetic Base dial indicator holder (No. 130), recently announced by Enco Mfg. Co., 4520-26 W. Fullerton Ave., Chicago 39, features precision adjustment op-



erated by a knurled set screw, permitting zero-ing. Its stem is of non-magnetic material to isolate the magnet from the indicator.
Circle Inform-A-Gram No. A63.

The Ridged Rubber Surface of the new Vise Gloves from S. C. Williams are perfect for holding soft metals, fine work, and screw threads in vise jaws. They can't scratch the metal and can't burr and hold a tighter grip on the work. Sizes to fit almost any 3" to 6" jaw are available from S. C. Williams Precision Tool Kits, Inc., 4448 Soo Line Lane, Schiller Park, Ill., or —
Circle Inform-A-Gram No. A64.

The New Air Control Valves manufactured by The A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N. Y., were thoroughly tested as an integral part of the AllenAir cylinders and



are now presented as a separate line. All of the 24 models feature two built-in speed controls and all friction surfaces are hardened and permanently coated with a baked-on lubricant.
Circle Inform-A-Gram No. A65.

Steelmobile
SIMPLIFIES and SPEEDS
✓ HANDLING
✓ TRANSPORTATION
✓ FEEDING of metal strip and bar stock to punch presses, shears, screw machines, etc.
TOP IS ADJUSTABLE
Can be positioned to suit machine heights
ELIMINATES EXTRA HANDLING
JUST ROLL STOCK TO MACHINES
. . . and start feeding
No Unloading
Gives Your Shop "Assembly Line" Efficiency
Just load strip and bar stock on Steelmobile, roll to machines and feed. No transferring. One man can easily maneuver up to 2000 lbs. Saves labor, speeds production, cuts costs. Quickly pays for itself.
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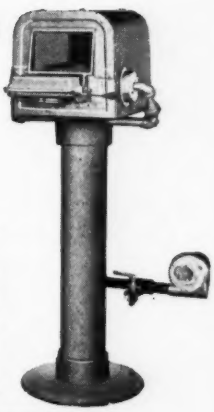
CIRCLE INFORM-A-GRAM KEY NO. 1791

SPEED PRODUCTION

ELIMINATE DELAYS with Quick Acting JOHNSON Furnaces

Heat treat high speed steels
Harden high carbon steels
Braze carbide tipped tools



JOHNSON No. 120 Hi-Speed

Heat treat tools, dies and small metal parts in your own plant. Quick Acting JOHNSON No. 120 Hi-speed delivers 1500° F. in 5 minutes, reaches 2300° F. in 30 minutes. Gets the job done fast to save time and gas. Temperatures easily regulated with accuracy. Firebox 5 x 7¾ x 13½. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

No. 120 Pedestal Style—$155.50 F. O. B. Factory

There is a Quick Acting JOHNSON Unit for every toolroom and shop. Write for complete catalog. Johnson Gas Appliance Company, 575 E Avenue, N.W., Cedar Rapids, Iowa.

JOHNSON Since 1901
FURNACES FOR INDUSTRY

CIRCLE INFORM-A-GRAM KEY NO. 1792

HYPNEUMAT

AUTOMATIC DRILLING AND TAPPING UNITS

SHORT CUT
YOUR MANUFACTURING PROCESS

Because:

1. Hypneumat Units quickly and easily set up.
2. Sealed Unit Construction.
3. Simple Basic Unit Design with only 2 basic moving parts.
4. Permits High Speed Close Tolerance Low Pressure Tapping without lead screws or tapping head.
5. Compressed Air or Hydraulically Operated.
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8. Fast Accurate Deep Hole Drilling Up to 25".
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10. Exclusive Quill Extension permits extremely close radial grouping.

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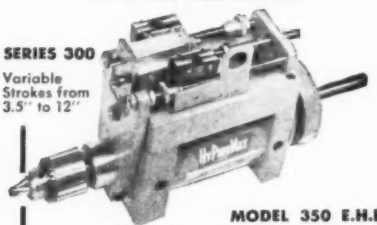

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Variable Strokes from 3.5" to 12"

MODEL 350 E.H.B.
3½" Stroke
⅜" Drill Cap. in Steel
⅜" Tapping Cap. in Steel

MODEL 335 G.S.M.
Stepless Speeds from 500 to 6000 RPM.
Stroke 3½"—Cap. ¼" in Cast Iron

SERIES 300
LONG STROKE UNITS
Stroke Lengths from 6" to 12"
Drilling Capacity ⅜" in Steel
Tapping Capacity ⅜" in Steel

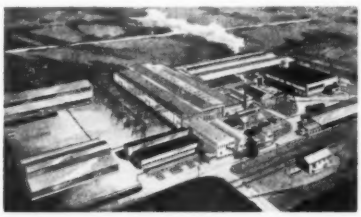
SERIES 500
HEAVY DUTY MODELS
Stroke Lengths to 25"
Built for heavy duty drilling and tapping.
Capacity 1½" in cast iron.

HYPNEUMAT, INC.
647 W. Virginia St. Milwaukee 4, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1801

NEW ENGINEERING BUILDING NEXT AT CLEVELAND CRANE

Construction has begun on a new $300,000 engineering building at The Cleveland Crane & Engineering Co., Wickliffe, Ohio, to accommodate 80 engineers and draftsmen engaged in designing Cleveland overhead traveling cranes, Cleveland Tramrail overhead materials handling equipment, Steelweld bending presses, heavy power presses, and metal-cutting shears which the company manufactures.



The third building in an expansion program that started in January, the engineering building will be connected with the present main office building by hallways.

This general view of the plant shows the new shipping and receiving building just below the water tank. In the foreground, in front of the crane runway, is the engineering building, now under construction.

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has been done with the SCLEROSCOPE
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CIRCLE INFORM-A-GRAM KEY NO. 1803

Egg Crate Grids Protect Metal While Degreasing

Efficient degreasing of metal parts calls for the parts not to touch the metal frame of the degreasing basket or each other.

To solve this problem, the Woodward Governor Co. has developed removable bottoms and divider inserts made of Masonite Tempered Presdwood for wire baskets.

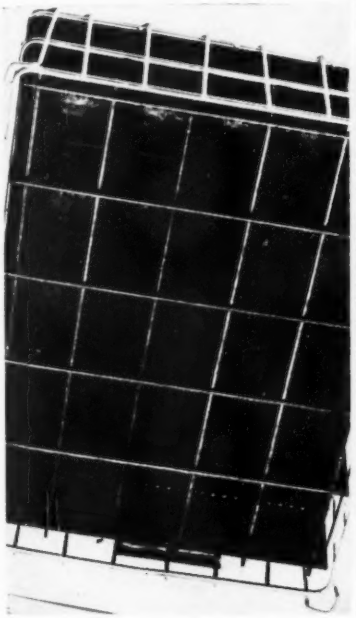

Photo courtesy Masonite Corp.

Bottoms are perforated Tempered Presdwood, and the dividers are slotted so they fit together and form an "egg crate" grid. Parts put into the baskets can touch only the hardboard, not each other or the wire basket.

The company uses the hardboard for inserts because it has found it to be the only inexpensive and suitable non-metallic material which is not affected by vapor degreaser fluid.

Divider strips have slots cut in various positions, so that the compartments can be assembled with various sizes and numbers of compartments per basket. In general, the assembled baskets are 18" x 24" x 6". Some types have panels with larger compartments to hold small cylindrical parts upright.

"FAST CUTTING"
Metal Finishing Compound

- For ALL Types Lapping Machines.
- Stays in suspension without agitation.
- Corrosion preventing, excellent cleaning, perfect wetting, does not become rancid.
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- Stocked in all popular types, grits—320 and finer.

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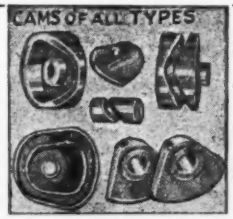
CAMS OF ALL TYPES

C A M S



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CIRCLE INFORM-A-GRAM KEY NO. 1813

You can be sure

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which can speed designs from drawing board to production run, require no heavy equipment investment or highly skilled labor, facilitate pilot runs and design changes, and

will save you up to 70% in time and up to 80% in cost

in making stretch dies, draw dies and panels, match dies, jigs, fixtures, patterns, models, prototypes, core boxes, plating shields, bag and contact molds, latex dip production forms, molds for fibrous glass lay-up, spray-metal backing, vacuum-forming, and electro-forming, and other types of tools and dies.

The versatile yet specialized liquid epoxy and phenolic resins developed by Marblette fit into your production picture. Convince yourself—see how they can give you increased economy and efficiency—use the handy coupon below for resin samples, technical data, a phenolic data folder, an epoxy data folder, and a conversion computer that shows at a glance how much resin to use for casting any size product or part.

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CIRCLE INFORM-A-GRAM KEY NO. 1814

COMET® offers SOLID CARBIDE INSERT BORING TOOLS

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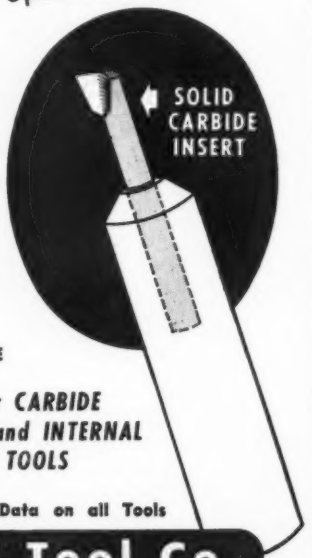
SIZES FOR HOLES FROM 1/16" UPWARD



ALSO AVAILABLE

HIGH SPEED or CARBIDE BORING, FACING and INTERNAL THREADING TOOLS

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COMET® Tool Co.

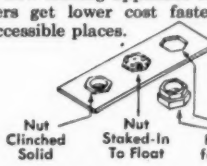
738-T BROADWAY • NEW YORK 3, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1821

use these GRIPCO CLINCH NUTS with the exclusive hex on hex feature

for "fixed" fastenings for "hard-to-reach" or blind assemblies. They wear longer, hold tighter, give greater customer satisfaction.

See how leading appliance manufacturers get lower cost fasteners into inaccessible places.



Gripco Clinch Nuts can be either clinched solid for a rigid application or staked in with a six point staking punch to give a floating effect. This floating effect takes care of misalignment and makes the application of the bolt easier. Gripco clinch nuts can be clinched or staked with stationary or portable hydraulic or air equipment. Details on request. Write for samples and data sheet.

Typical Applications

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Tractor Seats

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Automobile Frames

GRIP NUT COMPANY 113

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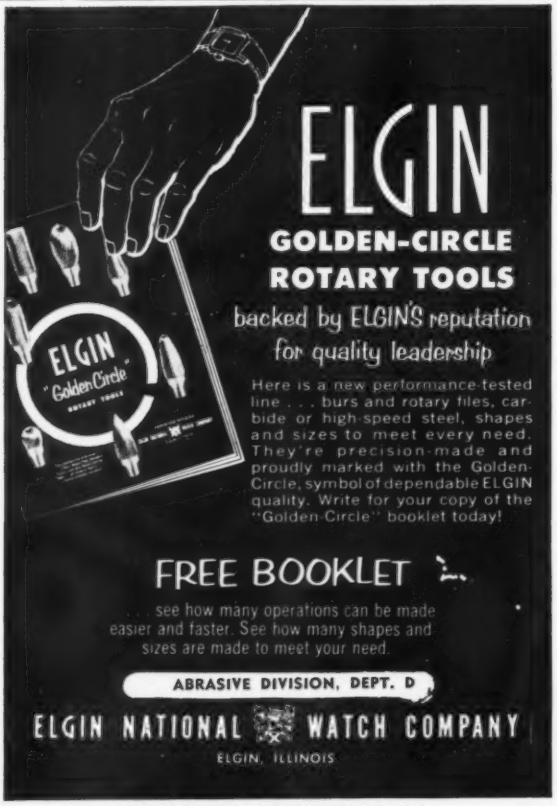
CIRCLE INFORM-A-GRAM KEY NO. 1822



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see how many operations can be made easier and faster. See how many shapes and sizes are made to meet your need.

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"QUALITY STAMPINGS IN SMALL QUANTITIES"

CIRCLE INFORM-A-GRAM KEY NO. 1824

Leveling Mounts Replace Machine Foundations

Size and weight of equipment is not necessarily a limiting factor when it comes to setting up machines. Through the use of Barry Leveling Mounts, punch presses like the 100-ton one pictured here, can be mounted to isolate dynamic shock, instead of needing a special, costly concrete bed.

The concrete floor under this machine is a slab only 5″ deep with imbedded wire mesh. Dual Barrymount isolators under each leg absorb the high impact shock, thereby eliminating the possibility of floor damage or transmission of the force to other machines on the floor. If mounts had not been used, the punch press, according to accepted engineering practices, would have needed a concrete slab, approximately 8′ x 6′, and 16″ to 18″ deep.

Photo courtesy Barry Controls Incorporated.

To mount this 100-ton press, Barry engineers recommended a dual mounting system for each leg, consisting of two LM-7 mounts on a single mounting place. Each of the LM-7 mounts has a load capacity of 13,000 lbs.

CORRECTION:
QUALITY CONTROL

Typographical errors crept into some of the column heads of the Provisional Control Limits tables published in the article "Short Cuts in Processing Quality Control Data", May 1955 page 92.

The heads should read A_2 $\bar{R}_{max}$ and D_4 $\bar{R}_{max}$, instead of as shown.

How REMINGTON RAND uses 3-D Micro-Vision to maintain peak shaver production

Remington Rand has solved the problem of critical inspection with Bausch & Lomb Stereomicroscopes. And it's done with an increase in production. Clear, sharp, magnified views of shaver head—with natural depth perception—quickly reveal flaws such as tiny cracks, bent blades, burrs, contact between cutter and head. Increased operator comfort, higher efficiency, keep peak production rolling.

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- Fit exact model to job needs with Selector-Chart!

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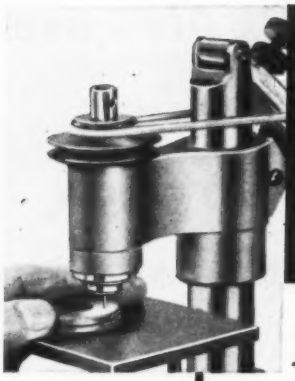


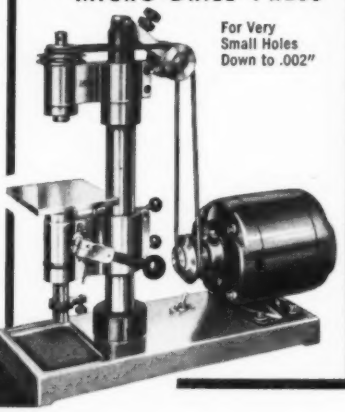
SMALL DRILLS
MUST BE HELD
IN PRECISION COLLETS
TO ASSURE ACCURACY

JEVIN

MICRO-DRILL PRESS

Designed to hold small drills in precision collets, thus overcoming the difficulty of making a drill run true as when held in a conventional drill chuck. Absence of a sliding quill guarantees maximum sensitivity with fingertip control. A mounted ⅛" capacity chuck can also be used.

Send for Catalog "M" describing Micro-Drill Press, full range of collet sizes, Micro-Drills, accessories and other precision tools.



For Very Small Holes Down to .002"

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CIRCLE INFORM-A-GRAM KEY NO. 1841

SAVE DRILLS!

NOW PRECISION DRILL GRINDING BY ANY INEXPERIENCED WORKER!

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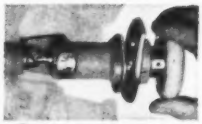
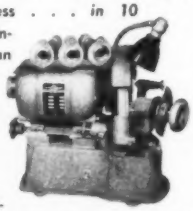


2 PUSH

3 TWIST

4 GRIND

The BLACK DIAMOND Drill Grinder restores a worn drill to like-new precision sharpness . . . *in 10 seconds!* Any inexperienced man (or woman!) is an expert grinder with this unit. Both lips ground at once . . . web-thinning equally simple! Pays for itself many times over!



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CIRCLE INFORM-A-GRAM KEY NO. 1843

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Special Accessories on model shown here available at slight extra cost.

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Today, BARKER MILLS are performing various machining operations in hundreds of diversified industries, large and small.

Rather than attempt to tell all here, we'd like to mail you the "BARKER" story with complete information on specifications, operational features, special accessories and the list of many users, many doubtless in your particular field.

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BARKER ENGINEERING COMPANY
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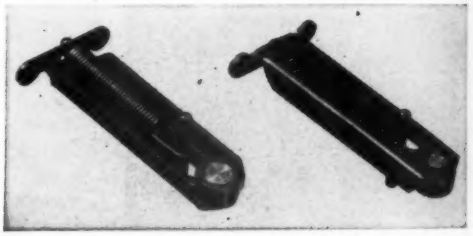
CIRCLE INFORM-A-GRAM KEY NO. 1842

FOR POSITIVE STOCK ALIGNMENT

IN PROGRESSIVE DIES



Amcor Roller Stock Pushers

SPEED UP PRODUCTION with precision-made AMCOR Roller Stock Pushers. Easy, smooth stock feeding, without buckling, assures more production with less operator fatigue.

SAVE MONEY. AMCOR Roller Stock Pushers sell for just a fraction of what hand-made bench models cost to make.

SIMPLE TO INSTALL. Requires only a slot milled in the stripper plate, and a hole drilled in the die block and stripper plate. Tracing template for slot and hole location is supplied. When die is sharpened, no refitting is necessary.

The AMCOR Roller Stock Pusher is quickly adaptable to any work specifications. Distributors throughout the country stock a complete line of nine models to fit all production needs.

Write us for complete information

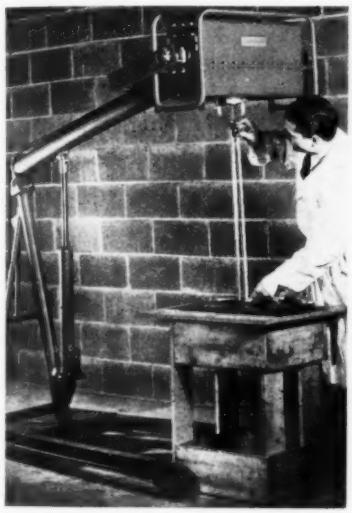
APPLIED MECHANICS CORPORATION
460 LYON, N. E. GRAND RAPIDS, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1844

Portable Crane Facilitates X-Ray Inspection

Designed to serve either as a stationary mounting or as a mobile base that can be used for on-location inspection throughout the factory, and to simplify radiographic testing methods, the Balteau Electric Corporation, has developed a hydraulic crane for handling the "camera" of its 200 KV industrial X-ray unit.

The crane permits the operator to raise and lower the "camera" or X-ray head to a maximum height of 87" and a minimum height of 24". An extension boom is available that widens the range of movement to a low of 14" and a high of 101". The head may be readily rotated through 360° around either vertical or horizontal axes.

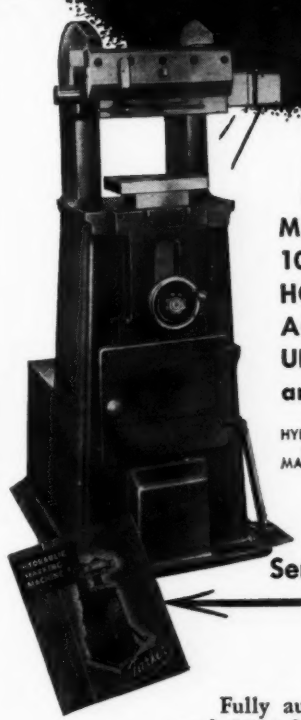


Precise hydraulic control of positioning contributes to more rapid handling of the instrument and enables the operator to complete radiographic examinations in a minimum of time. An added advantage is that structures that might normally be difficult to inspect by X-ray because of overhead locations can now be readily radiographed.

—•—

Machinery Associates, Inc. of Wynnewood, Pa., has been appointed exclusive representative in Washington, D. C., in addition to Philadelphia, for the Grinding Machine division of Norton Company. Under the new arrangement, they will handle both commercial and government business in the Capital.

Now... MARKING BECOMES A PRODUCTION LINE OPERATION WITH MARKING MACHINES by Parker



MARK UP TO 1000 PIECES PER HOUR WITH ACCURACY... UNIFORMITY... and SPEED!

HYDRAULIC #650 MARKING MACHINE

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HYDRA-PNEUMATIC #700 MARKING MACHINE

Fully automatic, the #650 and #700 Marking Machines are used for production marking round or flat surfaces.

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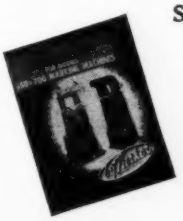

Standard or custom tooling for any marking application can be shipped from stock or designed and built to specification.

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MARKING DIE & MACHINERY DIV.

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CIRCLE INFORM-A-GRAM KEY NO. 1851

New Machine For Small Tool and Cutter Grinding

The latest addition to Cincinnati Milling Machine Company's line of cutter and tool grinding machines is the No. 1 Cutter and Tool Grinder, designed primarily for grinding and reconditioning small tools and cutters. It has a capacity of 8" swing and 15" between centers.

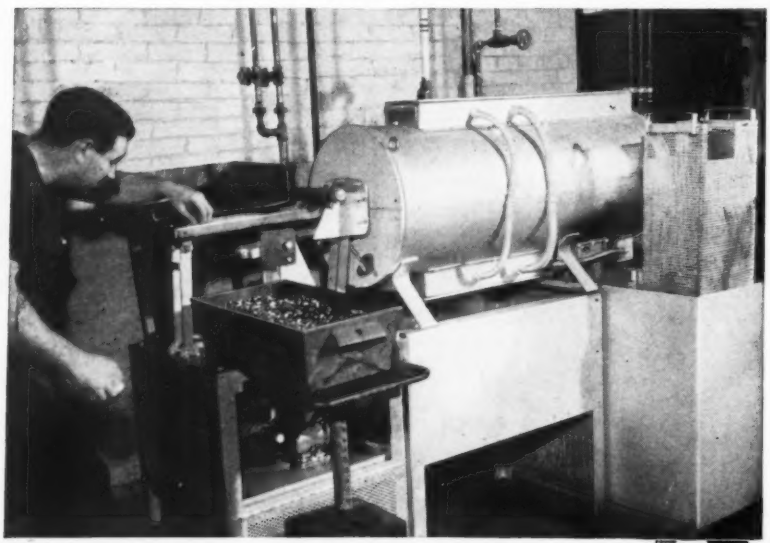
Like its companion machine, the larger No. 2, the new model has cartridge type grinding wheel spindle mounting with a double row of special preloaded anti-friction bearings, packed in grease for life-time lubrication.

The grinding wheel collets are quickly interchanged by removing a socket head screw, a feature that saves wear and tear on the spindle and operators knuckles. Curtain type dust guards beneath each end of the table protect the anti-friction table slide and table movement operating controls from abrasive dust.

An interesting innovation is the 360° eccentric wheelhead swivel which adds 3" to the conventional cross range, facilitating surface grinding operations and

assuring ample capacity for grinding large diameter cutters.

The swivel table "Tange Bar" taper setting device utilizes precision gage blocks for positioning the swivel table accurately, eliminating most of the "cut" and "try" when grinding angular cutters and tapered reamers.



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"Bright" Hardens Precison Springs in a HEVI DUTY SHAKER HEARTH FURNACE

"We bright harden carbon, vanadium, and stainless steel springs without distortion in our Hevi Duty Shaker Hearth Furnace," says the Raymond Mfg. Co. of Corry, Pennsylvania.

Hevi Duty standard Shaker Hearth Furnaces will carburize, nitride, dry cyanide or bright harden up to 150 lbs. of small parts per hour. Operation of this production machine is semi-automatic.

Write for bulletin HD-850 today.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

CIRCLE INFORM-A-GRAM KEY NO. 1861

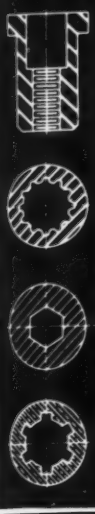
Riveting in Close Quarters

Riveting deep down between the inner and outer shells of jet engine cowlings might be considered an impossible task. However, at the Martin aircraft plant in Baltimore, production engineers have developed U-shaped jaws that serve as the anvil of a squeeze-riveting tool.

With the tool mounted on a counterbalance, one operator can drive rivets located more than 12" down between the two skins. The rivets are driven square and true to meet the high quality requirements, and a smooth aerodynamic surface is maintained, unscarred by an awkwardly-held bucking bar.

Le COUNT

SPECIAL MANDRELS for unusual bores



Threaded, splined, polygonal, tapered, plural diameters, extra long . . . Le Count special mandrels are made for all of these. And each Le Count "Special" has guaranteed concentricity of .0005" or .0002" T.I.R. as well as the speed-up operation provided by Le Count's unique hand-manipulation feature. Write today for Bulletin LC or send blueprints to Department E for quotation.

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SINCE 1847
CONTINUING W. G. Le COUNT TOOL WORKS
390 CAPITOL AVE., HARTFORD, CONN.

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Large Precision Machining

Done to your specifications

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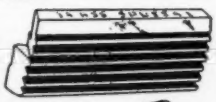
CIRCLE INFORM-A-GRAM KEY NO. 1872

ONE SOURCE -

Assures uniformity and precision between taps and chasers from country's largest independent manufacturer of die heads, chasers (milled, ground thread or tapped form) solid and solid adjustable taps. All tangent type chaser threads ground from solid. Write for catalog.

PROMPT DELIVERY

Save 10-20% on special solid taps



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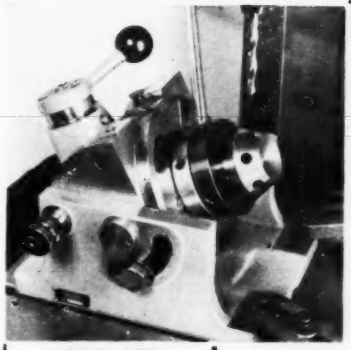
Representatives in principal cities

CIRCLE INFORM-A-GRAM KEY NO. 1873



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Precision Dividing Head

- High, Long-lasting Precision.
- Horizontal and Vertical Operation.
- Quick Indexing and Degree Indexing.
- 6 and 3 Minute Readings with Vernier.
- Easy Operation.
- Versatility Increased by Various Accessories.

Also Universal, Semi-Universal and simpler models and PRECISION ROTARY TABLES in various sizes and executions.

Each tool supplied with a test report. Max. Permiss. Error Chart supplied with literature.

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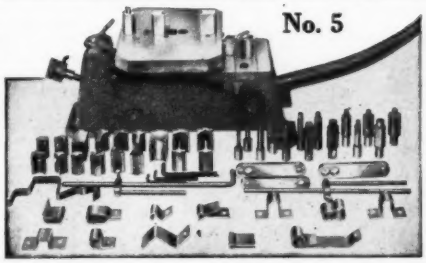

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Multiform

BENDER-CUTTER
CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛"x1½" as illustrated. Punching and round end blanking dies available. Other models up to ¼"x4" air operated.

ALSO AIR OPERATED MODELS.

KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1875

DEKA BORE

OFFSET BORING HEAD

repeats to

.0001"

in 30 seconds

DEKA-BORE (and only DEKA-BORE) can be adjusted in fractions of 1/10,000" on the full diameter as easily as reading 1/16" on a steel rule. NOT A VERNIER OR SCROLL ADJUSTMENT. Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

100% GUARANTEED!

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Gentlemen: Please send me
☐ Name of nearest DEKA-BORE distributor, who will arrange free demonstration.
☐ Free literature and prices.

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CIRCLE INFORM-A-GRAM KEY NO. 1876

Entries Invited For Methods Contest

Entries are now being accepted for the Fifth Annual Methods Improvement Competition sponsored by the Industrial Management Society in conjunction with its 19th Annual National Time and Motion Study and Management Clinic. The meeting is November 9-10-11, 1955 at the Hotel Sherman, Chicago.

Industrial plants and companies are invited to submit 16-mm motion picture films showing the "before" and "after" phases of methods improvements made in their manufacturing, processing or office operations. The Competition is divided into two sections —for companies over 1000 and those under 1000 employees. The Society will award trophies for first, second and third places as well as honorable mention prizes in both categories.

Rules and regulations for the 1955 Methods Improvement Contest may be obtained from the Society office, 35 East Wacker Drive, Chicago 1.

Inconel Conveyor Basket Unaffected by Corrosives

High temperatures for heat treating and the corrosive effect of carburizing and quenching oil baths subject workpiece containers to severe service.

The basket illustrated is a Wiretex Inconel conveyor basket subjected to such service. It is used on an automatic jack rabbit salt conveyor on which it takes approximately three hours for the basket to travel through the complete heat treating, washing, and drying cycle. Temperature of the heat treating cycle is 1650° F. Forty minutes are spent in the carburizing bath, and quenching is in agitated oil at 120° F.

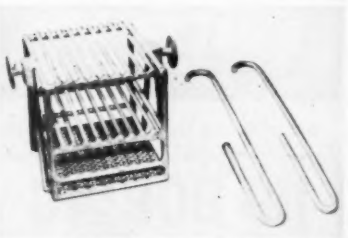


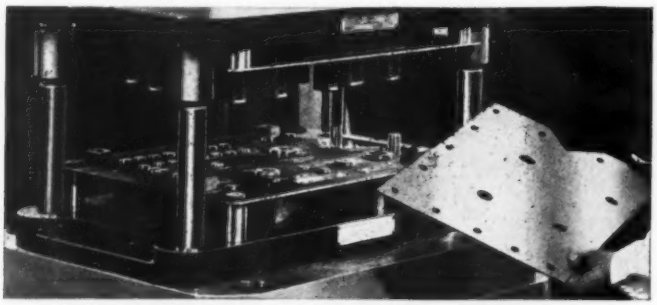
Photo courtesy Wiretex Manufacturing Co.

The conveyor operates on a 24 hr basis, 5 days a week, and the first of the baskets, put into use four months ago, shows no signs of corrosion or warping. The service has been severe due to the corrosive action of the salt and the heating and quenching cycles.

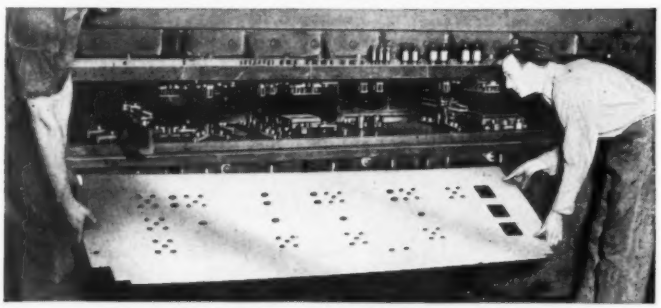
A total of 21 baskets are on the conveyor at any one time, including 4 in the salt bath. The work load per basket is 240 parts, weighing 25 lbs.

The basket allows completely automatic loading and unloading, carries a maximum number of parts in a minimum space, and exposes the largest possible surface area of each part to contact with the molten salt and quench oil. It allows for good salt drainage and easy cleaning, and minimizes warpage of parts.

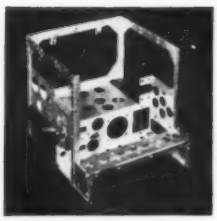
OVER 2,000 PLANTS *are making up their Metal Perforating Die Sets by Whistler methods*



WHISTLER **MAGNETIC PERFORATING** DIES



WHISTLER **ADJUSTABLE PERFORATING** DIES



- Lower die-making costs.
- Start production quicker.
- Save work handling labor.
- Increase press production.
- Versatile in job application.
- Perforate materials to ⅜" thick mild steel.
- Combine horizontal and vertical perforating operations.
- Work in practically any size or type of press.
- All parts re-usable and interchangeable.
- Precision assured on short or long runs.
- Parts interchangeable right in the press.
- Magnetic dies assembled on templates.
- Adjustable dies assembled on Tee slot die sets.
- Save floor and storage space.
- Die investment not "tied up."

SEE FOR YOURSELF *Without Obligation*

Our *illustrated* Catalogs show the simplicity, economy and versatility of Whistler methods. See for yourself why Whistler customers are the biggest names in industry.

WHISTLER DIES ARE CUTTING COSTS FROM COAST TO COAST

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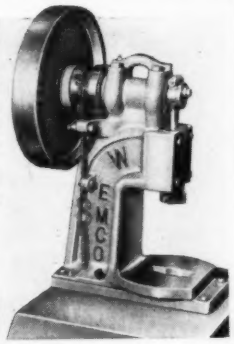
CIRCLE INFORM-A-GRAM KEY NO. 1881

EMCO "W", 5-ton bench type; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.



EMCO

Power Punch Presses Are Speedy and Safe

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, foolproof; simple design—easy to operate. Thousands of EMCOS in money-making use testify to Klaas dependability since 1921. Two practical sizes.

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KLAAS MACHINE & MFG. CO.
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— KLAAS BUILT —

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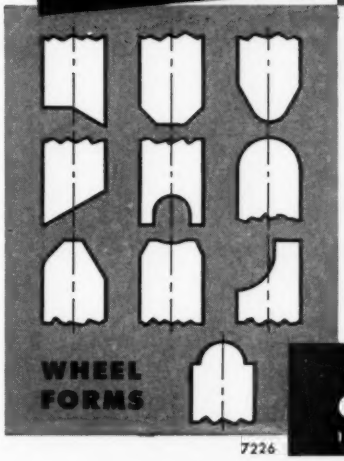
Precision Dress Grinding Wheels to ANY FORM IN ¼ THE USUAL TIME



The Perfex TANGI-MATIC Dresser is a self-contained precision tool built by an organization of master gagemakers for high precision work.

Any shop man who can read a "mike" can operate the dresser the first time. No Jo Blocks, no height gages or other auxiliary tools needed. All radii and angles are read directly.

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PERFEX GAGE & TOOL CO.
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CIRCLE INFORM-A-GRAM KEY NO. 1892

FOR —

PRECISION ENGRAVING

in STEEL and other METALS and PLASTICS you can't beat the well-known PREIS-PANTO line of Engraving Machines and Accessories

MODEL UE-3

Many models available for either 2 or 3 dimensional engraving and die cutting.

Trade Mark PANTO

Write for details.

H. P. PREIS Engraving Machine Co.
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CIRCLE INFORM-A-GRAM KEY NO. 1893

B&L Magnifiers

B&L CAN SAVE YOUR PLANT MONEY!

See that receiving inspection and purchasing are supplied with industrial magnifiers . . . use them in design engineering and your sample shop . . . also for assembling and production inspection. Prompt detection of defective materials and workmanship can save a company untold sums in a year.

FREE! *Write today for tell-all booklet and catalog,* "INDUSTRIAL MAGNIFIERS, HOW TO CHOOSE AND USE THEM."... *Bausch & Lomb Optical Co., 50442 Bausch St., Rochester 2, New York.*

BAUSCH & LOMB
SINCE B&L 1853

CIRCLE INFORM-A-GRAM KEY NO. 1894

DRAW KEY LOCKS TAPER SHANK TOOLS IN MACHINE SPINDLE

Locking Morse taper shank tools quickly and securely in machine spindles is now accomplished by a simple mechanism known as the Davis Adjustable Draw Key lock, designed, built and patented by the Davis Boring Tool Division of Giddings & Lewis Machine Tool Company.

Consisting of but three rugged, trouble-free moving parts — expanding wedge, plunger and adjusting nut — this new Adjustable Draw Key locks tool shanks positively in machine spindle with one, easy wrench adjustment. It is available in a complete range of sizes to fit virtually all machines with spindle diameters from 3″ through 8″, and draw key slots from 33/64″ x 1⅛″ through 11/16″ x 1⅜″. A wide range of wedge adjustment in the adjustable draw key design accommodates variations in shank and spindle slot location. Thus, the large assortment of solid keys normally required is eliminated together with any possibility of marring spindle or tool shank by hammering in old-fashioned keys.

Use of this new draw key lock saves considerable time. It is only necessary to insert the tool shank in the spindle, drop the draw key into spindle and shank slots and turn up the adjusting nut, located in one end of the key, with an Allen wrench to expand the key's wedge. Steady pressure of the expanding wedge seats the tool shank securely in the spindle, locking it there until the adjusting nut is reversed. To remove the key, merely loosen the adjusting nut, relieving wedge pressure. Tool shank can then be withdrawn from the spindle. Tools can be inserted in and removed from machine spindles, using the draw key, in a matter of seconds.

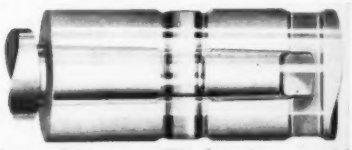

Fig. 1. Illustrating method by which Davis Adjustable Draw Key locks tool shank in machine spindle.

All working parts of the new draw key are precision machined from tool steel, and the entire mechanism is exceptionally rugged and simple. Removal of two pins permits easy disassembly of the key for cleaning and lubrication — all parts being removable from the body barrel, except the wedge, which slides out of its own slot.

Fig. 2. View of simple, rugged mechanism of the patented Davis Adjustable Draw Key.

An outstanding advantage of the draw key is the complete absence of any exterior attachments to the machine spindle. When in place, this key is entirely inside the spindle slot — and within the spindle's outside diameter. Moreover, since its action merely improves on the solid key, through the application of sound mechanical principles, there is nothing new for the operator to learn in its use.

Here is a completely new electric-hydraulic forcing and straightening press, with construction and operating advantages never before offered in a low-cost shop press.

These are a few of the features:

- **Rapid Ram Approach** — Automatically changes to power stroke when it contacts the work.
- **Movable Workhead** — Self-contained—easy to center over the work. Workhead can be purchased separately.
- **Variable Ram Speed** — From zero to maximum under fingertip control.
- **Modern Design** — All operating controls at convenient working height.

These and dozens of other features are fully described and illustrated in new Bulletin No. 347, which we will send promptly on request. Send the coupon today.

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CIRCLE INFORM-A-GRAM KEY NO. 1901

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All collets in hexagon, square and round.

KLUTCH-KOLLET

Stop collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

FOR ATLAS • LOGAN • SOUTH BEND CRAFTSMAN • SHELDON LATHES, ETC.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

LIVE CENTER (Ball Bearing) Double sealed for accuracy.

KASSON Precision

KASSON Precision products are guaranteed unconditionally for accuracy, fit and long life. Your dealer should have them . . . Write us for literature!

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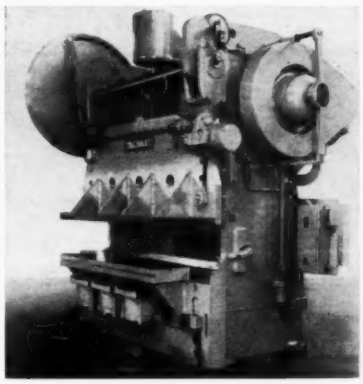
LONG ISLAND CITY 1, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1912

Steel Press Brake Also Used For Shallow Draw Work

This Cincinnati All Steel Press Brake is an example of the special arrangements available on press brakes manufactured by The Cincinnati Shaper Co. It doubles for use in shallow draw work and various other types of press operation.



It has a 36" permanently wide bed, ram with a shut height of 15", and 8' overall die surface. In addition, it is equipped with an air-electric clutch with automatic stop and non-repeat. The two foot pedals are arranged to operate as one unit or can be operated separately. The interlocking feature insures safety, especially in multiple press operations.

Other features include a special two speed transmission operating at 13 and 30 strokes per min., an air counterbalance, and a 5" stroke.

Petch Manufacturing Company of Detroit is now the exclusive sales outlet for the Hupp Threadless Subplates. The Petch organization manufactures a line of industrial air and hydraulic cylinders and the threadless subplate, originated by R. C. Hupp, is used as a substitute for currently furnished manifold mounting plates for standard hydraulic and pneumatic valves.

Homer B. Johnson Company of Oak Park, Ill., will offer the Freeland Gauge Company's complete line of gages, special reconditioning services, and gage engineering to the northern part of Illinois; Lake County, Ind.; and Scott County, Iowa., according to President Reed J. Altenburgh of Freeland Gauge.

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Completely Different

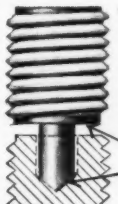
SET-KO **SET SCREWS**

NEW

MULTI-FLUTED SELF-TAPPING SET SCREWS

Additional cutting edges on these screws make tapping easier and produce a better thread. Especially suited for metals difficult to tap. Also, with standard threads this screw can be used in paint-filled tap holes, as a clean-out or reaming screw, saving additional operations —yet remaining in hole as a standard screw. Can be designed for hopper feeding. Available with slot, hexagon or fluted socket, and with any type point.

pat. pend.



(pat. pend.)

NEW

PIVOT-LOK SET SCREWS

For jobs using two screws for security purposes, or where vibration is a factor.

Pivot on top screw acts as a bearing, avoids friction between the two screws and prevents damage to the lower socket.

Provides positive holding action, but both screws easily removed when desired. Send for Bulletin.

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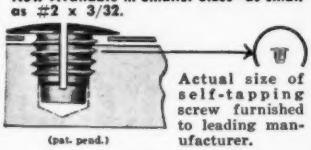

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CIRCLE INFORM-A-GRAM KEY NO. 1913

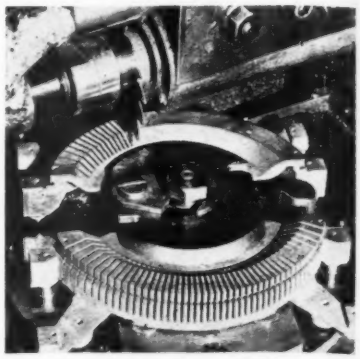
Carbide Tipped Saw Reduces Slotting Costs

Use of special carbide-tipped saws in milling machines for precision cutting slots in cast iron segments of office typewriters, recently tripled net production per hour per machine in the plant of Smith-Corona, Inc., thereby slashing total slotting cost per part, despite higher costs of the carbide-tipped cutters.

The saws, designed for the company by Gay-Lee Co., using Carboloy grade 883 carbide, stepped up both cutter feeds and speeds, and also stretched-out production time by reducing machine downtime for saw changes and subsequent regrinding.

Cutting operation at Smith-Corona involves making 44 slots in the segment—used to receive bars of the office machine. The work is done on a Producto milling machine with a 3½" dia. saw operating at 700 rpm, or cutter travel of 640 sfpm.

Each casting comes to the milling machines in its finished form.



Closeup showing how cast iron segments of office typewriters are slotted two at a time on this milling machine in the plant of Smith-Corona Inc. Consistently accurate cuts of the saw tipped with Carboloy grade 883 carbide not only speeds production, but expedites assembly of type bars.

Slotting is the last operation prior to assembly, and accuracy of the cuts has a definite bearing on subsequent assembly procedures. The accurate cuts provided by the Carboloy grade 883 carbide minimizes inspector's rejections and also permits more rapid fitting of the type bars.

In the operation, segments to be slotted are clamped in place on the milling machine two at a time. A jig assures proper positioning and an indexing mechanism, built into the machine, automatically positions the segment under the saw for each cut.

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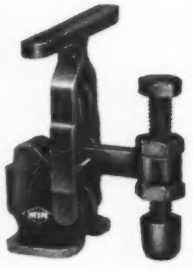

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Now buyers have option of four extended-payment plans with small down payment and the balance in monthly payments over one, two, three, or four years. There are four lease plans with or without option to buy, each extending over a term of nine years.

Circular No. EPL-366 from Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, explains all the plans.

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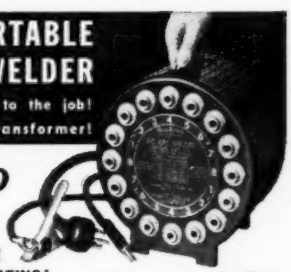

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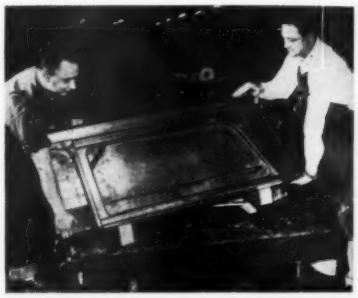
CIRCLE INFORM-A-GRAM KEY NO. 1941

Plastic Tooling Saves Time, Cost for Prototype Auto Bodies

IN THE PRODUCTION of prototype automobiles for testing, the Automotive Body Division of the Chrysler Corp. has found considerable savings in time and cost in turning to plastic tooling. These savings were brought about by the ability of plastics to be cast in the liquid state and harden in a short time into tools with sufficient strength and accuracy to replace metal and wood metal-forming tools.

The plastic tooling of prototypes was undertaken for the 1955 Plymouth program, with some parts and panels made for other models.



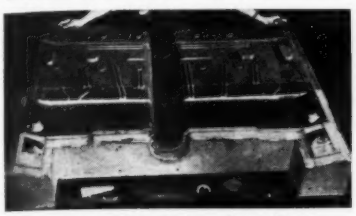
Even large forms cast from phenolic resins are conveniently light in weight, as is shown by the ease with which two workmen lift a big hammer form.

The simplicity of the plastic tooling operation made it possible for the tools to be fabricated in Chrysler's own model shop, with only about 2000 sq. ft. of floor space needed, and no costly equipment required.

While suitable end products could be obtained by several methods using various materials, Marblette phenolic resins No. 76 and 78 were selected as the basic materials after checking and comparison. Since these resins are available in liquid form and had merely to be mixed with hardener and poured into a mold, they saved labor and provided very inexpensive tools.

The phenolic materials were found to be flexible and strong enough to withstand the stresses placed on hammer forms, stretch forms, and short-run hydroform and draw dies. Phenolic foam

was used to reduce the weight of tools and to conserve materials costs. The plastic tooling program was further aided by new Marblette-developed high-strength phenolic resin for room-temperature cure, which cut down on the need for recasting tool surfaces with epoxy. While this resin had less stability than oven-cured phenolics, it was suitable for its application to tools intended to serve their purpose inside 6 to 8 wks. A more stable resin was used for duplicate models and check blocks.



Another plastic tool used in this engineering program — a complete phenolic hammer form without sharp contours.

Where high impact strength and exceptionally light weight were required for such applications as large checking fixtures and duplicate models, epoxy and polyester resins were utilized with fibrous glass. Tools were fabricated of these materials by the layup method.

Cast epoxy surfacing was used only when higher physical properties than those of the phenolic materials were required — as when the contour of a hammer form had sharp radii, and several body panels had to be produced.

The basic plastic tooling procedure that was followed varied to a certain degree. In general, however, the contour of each part was established either in clay or by means of mahogany models. In an emergency, a quick pine model was fabricated. Such a model, as for example a fender that could be fabricated in pine by three men in approximately four days, provided all the requisite physical dimensions.

Once the contour was established, a mold for the plastic was taken from the model—using plaster or laminated skin of epoxy reinforced with plaster. The plaster molds were sealed with moisture-resistant lacquer. Wax was the release agent.

Harold A. Seils, Chrysler's automotive body division plastics foreman, shows Frank Bogart of Marblette a sharp contour resurfaced with epoxy on a hammer form.

To construct a hammer form or hydroform block, the sides of the plaster mold were built up with a wood frame and the plastic mixed and poured. After this set overnight at room temperature, it was removed from the mold.

. . . *Continued on page 196*

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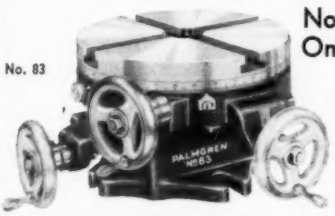

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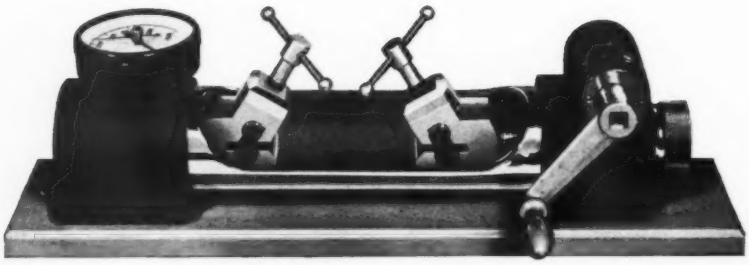

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CIRCLE INFORM-A-GRAM KEY NO. 1962

. . . Plastic Tooling, from page 195

If higher strength were necessary on sharp contours, the phenolic tool would be raised ⅛" to ¼" from the mold, and a surfacing of cast epoxy poured into the space. This surface material bonded to the phenolic backing. If only a very small area was critical, the phenolic was chipped back at that point. The tool was replaced in the mold, and the epoxy poured into the phenolic gap.

At the Chrysler shop phenolic resin is weighed and mixed with hardener.

Phenolic foam reduced the amount of material used for large tools. Rough pine templates were suspended in the mold, and foam phenolic (previously cast and cut to rough shape) was suspended to take up space. This was positioned approximately 1½" from the mold. Liquid phenolic resin was then poured in to bond the frame and foamed core, and furnish a working space approximately 1½" thick. The resin was poured short of the top of the pine frame which was set above the molds and levelled. This frame then acted as the base when the tool hardened. The resulting

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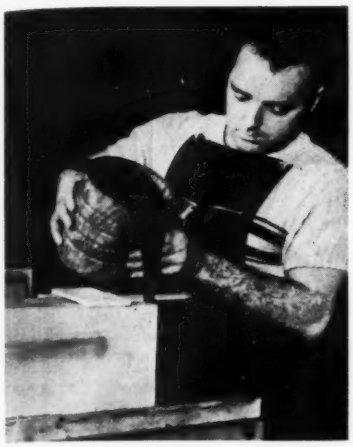
CIRCLE INFORM-A-GRAM KEY NO. 1963

tools were of sufficient accuracy to make prototype steel panels checked against templates.

Many duplicate models and check blocks were cast by suspending a block of mahogany in a mold approximately ¾" from the sides and face, to act as the base of the tool, and then pouring in a surface coat of phenolic to pick up the contour.



The resin is poured into a mold for casting a tool to hydroform 0.030" cold-rolled steel.

Plastics proved their greatest worth in meeting rush schedules. In one instance, a hydroform block was poured and cured overnight with heat lamps, and 120 urgently needed panels were formed from it the next day. With steel body panels hammered out on phenolic tools, a complete car was built in 30 days. The use of plastics in one phase of the program led to a $60,000 saving in labor over a previous similar phase of Chrysler activity.

The success of the program showed that there is no end to the advantages of plastics in speeding engineering programs, especially with the emergence of new materials to lower costs and improve results.

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Titanium will soon be rolled to an unprecedented thickness of 0.0005", according to Monroe Sherman, president of the American Silver Co. The company has already successfully rolled the metal down to the record thinness of 0.0008" in commercial quantities.

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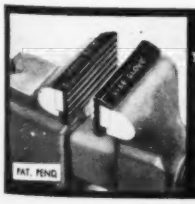

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Abrasive Engineers 181
Accurate Bushings Co. 126
Ace Drill Bushing Co., Inc. 151
Acme Broach Corp. 149
Acme Industrial Co. 136
Acro Metal Stamping Co. 43
Advance Products 151
Aget Mfg. Co. 175
Alina Corp. 172
Allegheny Ludlum Steel Corp. 119
Allen, Alva F. 176
Allen Mfg. Co. 31
Allied Products Corp.
Richard Brothers Punch Div. 22
American Cystoscope Makers, Inc. 155
American Pullmax Co., Inc. 168
American Wheelabrator & Equip. Corp. 103
Applied Mechanics Corp. 184

Bakelite Co., Div. Union
Carbide and Carbon Corp. 55
Baker Brothers, Inc. 33
Balas Collet Mfg. Co. 7
Barker Engineering Co. 184
Barth Corp., The 194
Bausch & Lomb Optical Co. 28, 183, 189
Bellows Co., The 98
Besly-Welles Corp. 59
Black Diamond Saw & Machine Works. 184
Black Drill Co., Inc. 158
Bliss Co., E. W. 62
Boyar-Schultz Corp. 199
Brand Tool & Supply Co. 161
Bryant Chucking Grinder Co. 105
Burg Tool Mfg. Co. 109

Cadillac Gage Co. 8
Cardinal Machine Co. 172
Carpenter Steel Co., The 50
Centerless Products Co. 171
Central Safety Equipment Co. 156
Challenge Machinery Co., The 154
Chandler Tool Co. 20
Chaso-Royco Tool Co., Inc. 187
Chicago Screw Co. 170
Chicago Tool & Engrg. Co. 195
Cincinnati Milling Machine Co., The .. 91
Cleveland Crane & Engrg. Co., The 58
Collins Co., H. G. 150.3
Comet Tool Co. 182
Comtor Co. 105
Continental Tool Works,
Div. Ex-Cell-O Corp. 127
Crobalt, Inc. 162
Cross Co., The 120

Dake Engine Co. 190
Danly Machine Specialties, Inc. 11, 51, 101
Dayton Rogers Mfg. Co. 100, 147, 178
Deltronic Corp. 162
Detroit Power Screwdriver 10
Detroit Reamer & Tool Co. 92
Detroit Stamping Co. 151
Detroit Testing Machine Co. 196
DeVlieg Machine Co. 42
DeVlieg Microbore Co. 47
Dickerman Mfg. Co., H. E. 138
Die Supply Co., The
Div. of E. W. Bliss Co. 123
DoAll Co., The 21
duMont Corp., The 178
Durable Punch & Die Co. 139
Durant Tool Supply Co. 164
Dykem Co., The 159

Economy Tool & Machine Co. 160
Eisler Engineering Co., Inc. 181
Elgin National Watch Co. 182
Elk Tools, Inc. 197
Erickson Tool Co. 68
Erico Products, Inc. 175
Ex-Cell-O Corp.
Continental Tool Works Div. 67, 127

Fairfield Gauge Co. 174
Federal Machine Tool Co. 108
Federal Tool & Mfg. Co. 182
Ford Mfg. Co., Inc., M. A. 163
Fulton Foundry & Machine Co., Inc. 150.1

Gaertner Scientific Corp., The 140
Gage Co. 170
Gairing Tool Co., The 108
Gardner-Denver Co.,
Keller Tool Div. 44
Gas Appliance Service, Inc. 169
Gatco Rotary Bushing Co. 165
Genesee Mfg. Co. 151
Gorton Machine Co., George 60
Grawell Carbide Tool Co. 176
Graymills Corp. 173
Gries Reproducer Corp. 191
Grip Nut Co. 182

Hamilton Tool Co., The 129, 131, 133
Hammond Machinery Builders, Inc. 121
Hannifin Corp. 168
Harco Engrg. Co. 197
Hardinge Brothers, Inc. 54
Haskins Co., R. G. 113
Hawkeye Specialty Co. 193
Hayden Twist Drill Co. 160
Heimann Mfg. Co. 197
Henry & Wright Div.,
Emhart Mfg. Co. 49
Hevi Duty Electric Co. 186
Horberg Gage Co., The 167
Hovis Screwlock Co. 141
Hutchinson Co., William T. 174
Hypneumat, Inc. 180

Industrial Diamond Assoc. of
America, Inc. 167
Industrial Tectonics, Inc. 158
Injection Molders Supply Co. 154

Jaco Devices, Inc. 176
Jarke Mfg. Co. 179
Johnson Gas Appliance Co. 179
Jo-Line Tools, Inc. 155
Jones & Lamson Machine Co. 13
J & S Tool Co., Inc. 97

Kasson Die & Motor Corp. 191, 193
Kearney & Treacker Corp.
Special Machinery Div. 35
Keller Tool Div.,
Gardner-Denver Co. 44
Kennametal, Inc. 16
Kidde Precision Tool Corp. 187, 196
Klaas Machine & Mfg. Co. 189

Lakeside Steel Improvement Co., The. 150.4
Lamina Dies & Tools, Inc. 200
Lapeer Mfg. Co. 128
Lassy Tool Co. 172, 176
Latrobe Steel Co. 45
Lavallee & Ide, Inc. 4
Laystrom Mfg. Co. 94
LeCount Tool Works, Inc. 187
Lee Co., K. O. 176
Lempco Products, Inc. 148
Lepel High Frequency Labs., Inc. 23
Levin & Son, Inc., Louis 184
Littell Machine Co., F. J. 164
Lodding, Inc. 146
Logan Engineering Co. 112
Longley Co., Truman E. 150.4
Lucas & Son, Inc., J. L. 174

Machine Products Corp. 106
Madison-Kipp Corp. 166
Marblette Corp., The 181
Maxwell Co., The 156
Mayline Co. 156
McCrosky Tool Corp. 102
Mead Specialties Co. 105
Medelton Co., Inc., The 108
Metal Carbides Corp. 65
Meyers Co., Inc., W. F. 178
Michigan Drill Head Co. 5
Micro Drill Guide 178
Micromatic Hone Corp. 158
Micrometrical Mfg. Co. 162
Milne & Co., A. 29
Modern Industrial Engrg. Co. 104
Moline Tool Co. 137
Moore Special Tool Co., Inc. 52
Motch & Merryweather
Machinery Co., Inc., The 38
Moto-Truc Co., The 24

National Machine Tool Bldrs. Assoc. .. 39
Neise, Karl A. 187
Niagara Machine & Tool Works 36
Nicholson File Co. 15
Nobur Mfg. Co. 96
Northwestern 163
Norton Co. 134, 142
Numberall Stamp & Tool Co. 154

Octavia Tool & Gage Co. 172
Oliver Instrument Co. 172
O'Neil-Irwin Mfg. Co. 66

Parker Stamp Works, Inc. 160, 185
Perfex Gage & Tool Co. 189
Perkin-Elmer Corp. 159
Perkins Machine Co. 144
Pioneer Engrg. & Mfg. Co. 196
Pope Machinery Corp. 132
Portage Machine Co., The 9
Porter Precision Products 130
Pratt & Whitney
Div. Niles-Bement-Pond Co. 18, 19, 25
Precise Products Corp. 158
Precision Tool Mfg. Co. of Ill. 187
Preis Engraving Machine, H. P. 189
Procunier Safety Chuck Co. 193
Producto Machine Co. 61, 173
Putnam Tool Co. 3

Rahn Granite Surface Plate Co. 181
Red Seal Metals Co. 180
Reid Brothers Co., Inc. 111
Reid Tool Supply Co. 159
Relco Carbide Tool Co. 161
Reliant Industries 26
Renite Plastics, Inc. 150
Rice Pump & Machine Co. 160
Richard Brothers Punch Div.
Allied Products Corp. 22
Richards Co., J. A. 187
Ring Punch & Die Co. 143
Roll Feeds Corp. 170
Roto-Finish Co. 124
Rotor Tool Co. 117

Sales Service Machine Tool 107
Scherr Co., Inc., George 156, 166, 171
Seibert & Sons, Inc. 110
Service Machine Co. 161
Service Machine Co., Inc. 193
Set Screw & Mfg. Co. 191
Shore Instrument & Mfg. Co., Inc. 180
Sibley Machine & Foundry Corp. 53
South Bend Lathe Works 174
Spiral Step Tool Co. 6
Spring Specialty Co. 170
Standard Electrical Tool Co. 145
Standard Parts Co. 118
Standard Pressed Steel Co. 40
Star Stainless Screw Co. 108
Stebar Co. 164
Sturdy Broaching Service 154
Sturtevant Co., P. A. 174
Superior Steel Products Corp. 57
Surveyors Service Co. 168
Sutton Tool Co. 2
Swartz Tool Products
Div. of Jefferson Corp. 95

Tannewitz Works, The 96
Thermo Electric Mfg. Co. 150
Thompson & Son Co., The Henry G. 34
Tietzmann Tool Corp. 171
Timken Roller Bearing Co.
Steel & Tube Div. 17
Tomco Products Co. 173
Tomkins-Johnson Co. 125
Twentieth Century Mfg. Co. 146

U. S. Burke Machine Tool Div., The 30
United States Diamond Wheel Co. 176
U. S. Tool Co., Inc. 46
Universal Engineering Co. 27

Verson Allsteel Press Co. 1, 96
V & O Press Co., The
Div., Emhart Mfg. Co. 48
Vogel Tool & Die Corp. 166
Vulcan Tool Co. 12, 114, 157

Wales-Strippit Corp. 41
Walker Hydraulic Duplicator Co. 56
Walls Sales Corp. 116
Wardwell Mfg. Co., The 147
Watts Brothers Tool Works 173
Wedin Corp. 101
Weldon Tool Co. 177
Wesson Co.
Affiliated with Wesson Metal Corp. .. 70
West Point Mfg. Co. 192
Wheelock, Lovejoy & Co., Inc. 32
Whistler & Sons, Inc., S. B. 188
Whitman & Barnes, Inc. 14
Williams Precision Tool
Kits, Inc., S. J. 195, 197
Wilton Tool Mfg. Co., Inc. 169
Wirth & Son, Inc., Carl 171
WLS Stamping Co. 162

Yost Mfg. Co. 160

Zagar Tool, Inc. 64

0, 185
..189
..159
..144
..196
..132
... 9
..130
19, 25
..158
..187
..189
...193
1, 173
... 3
...181
...180
...111
...159
...161
... 26
...150
...160
... 22
...187
...143
...170
...124
...117
...107
56, 171
...110
...161
...193
...191
...180
... 53
...174
... 6
...170
...145
...118
... 40
...108
...164
...154
...174
... 57
...168
... 2
... 95
... 96
...150
... 34
...171
... 17
...173
...125
...146
... 30
...176
... 46
... 27
..1, 96
... 48
...166
14, 157
... 41
... 56
...116
...147
...173
...101
...177
orp.. 70
...192
... 32
...188
... 14
95, 197
...169
...171
...162
...160
... 64

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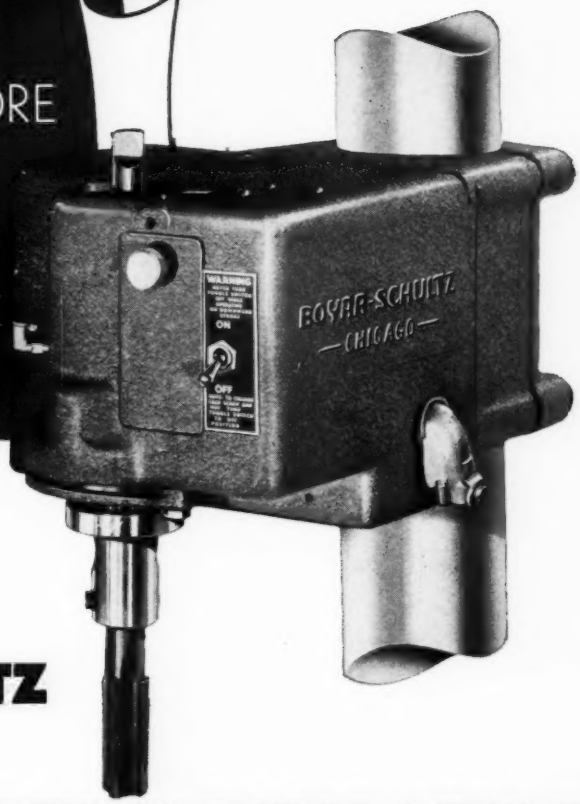

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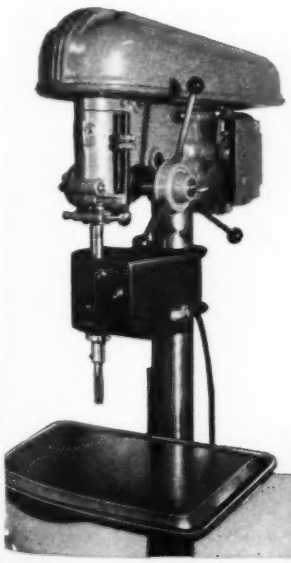

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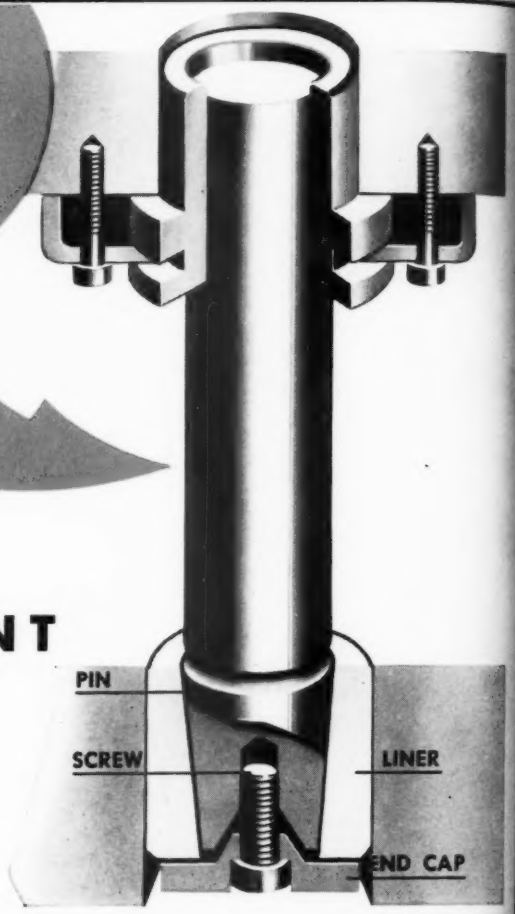

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